

**33rd
YEAR**

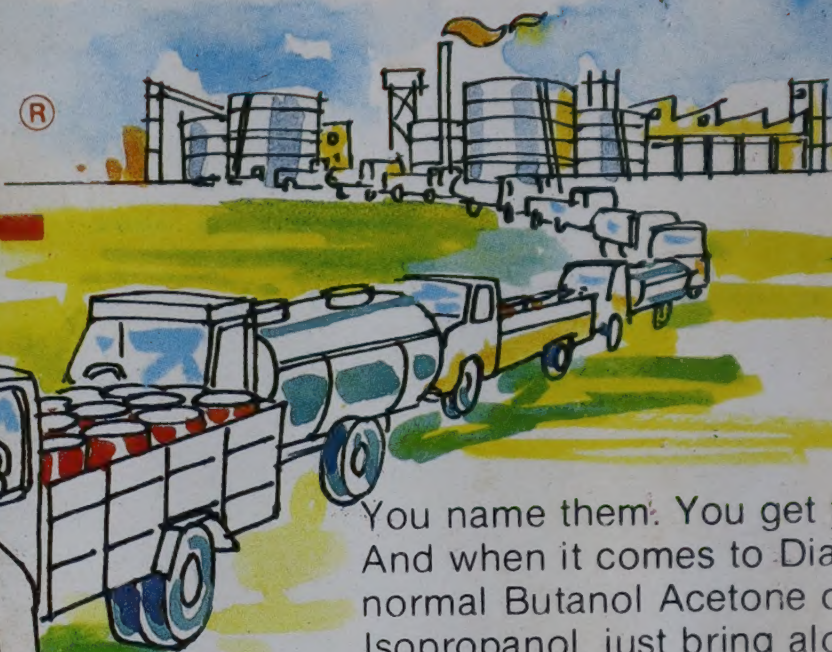
CHEMICAL WEEKLY

VOL. XXXIII

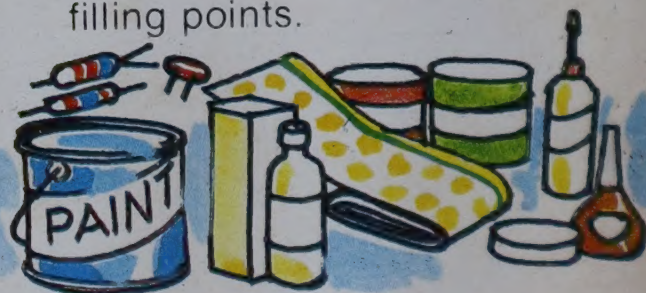
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NO. 24

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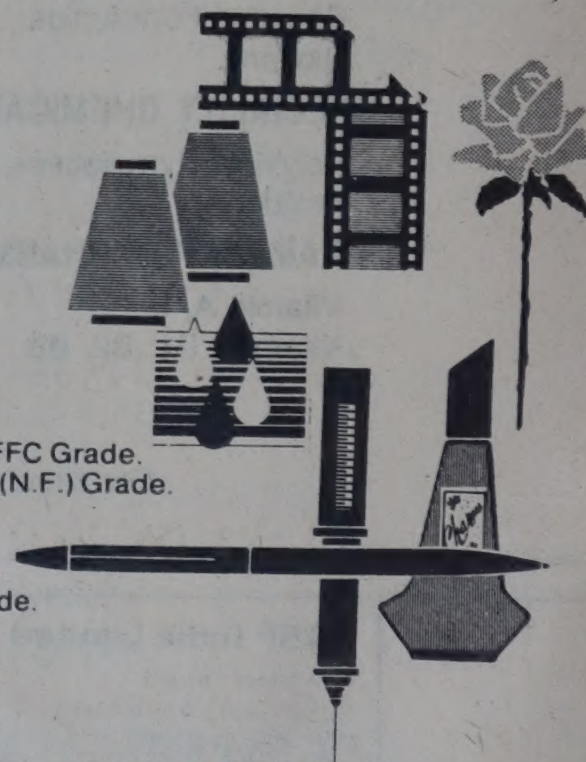
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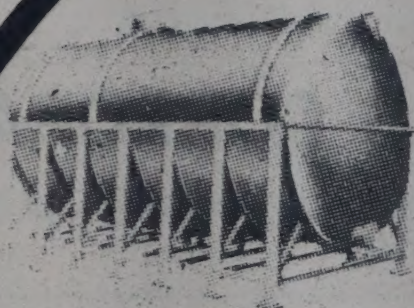
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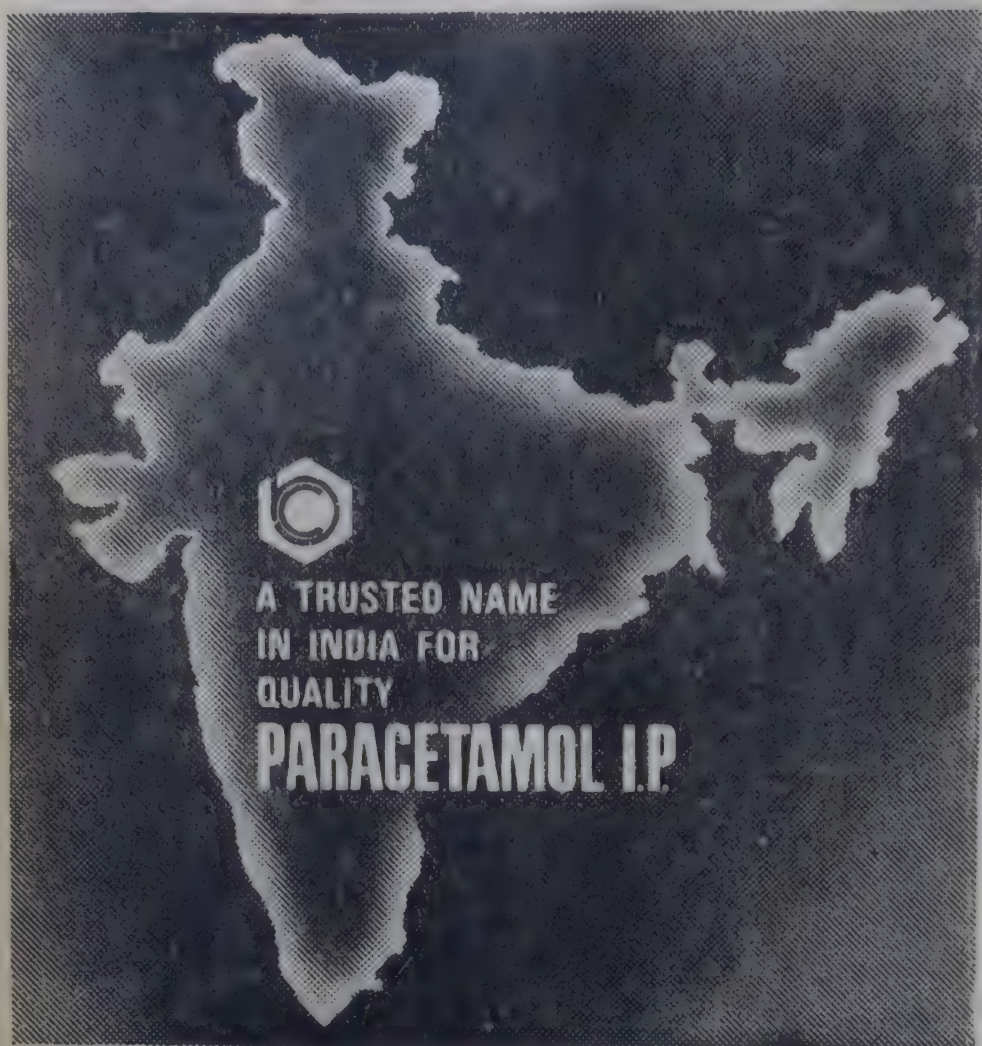
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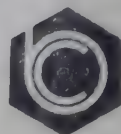
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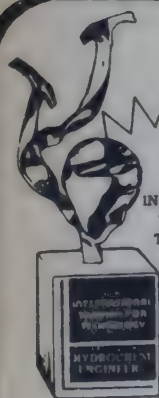
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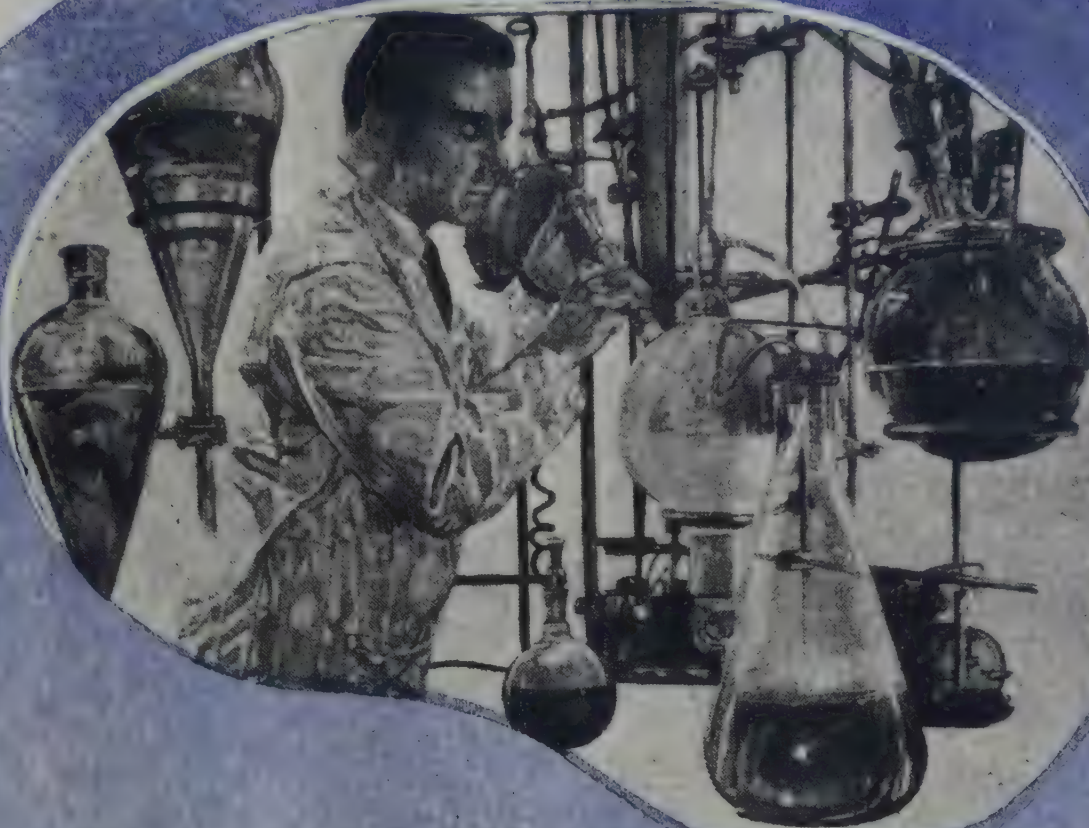
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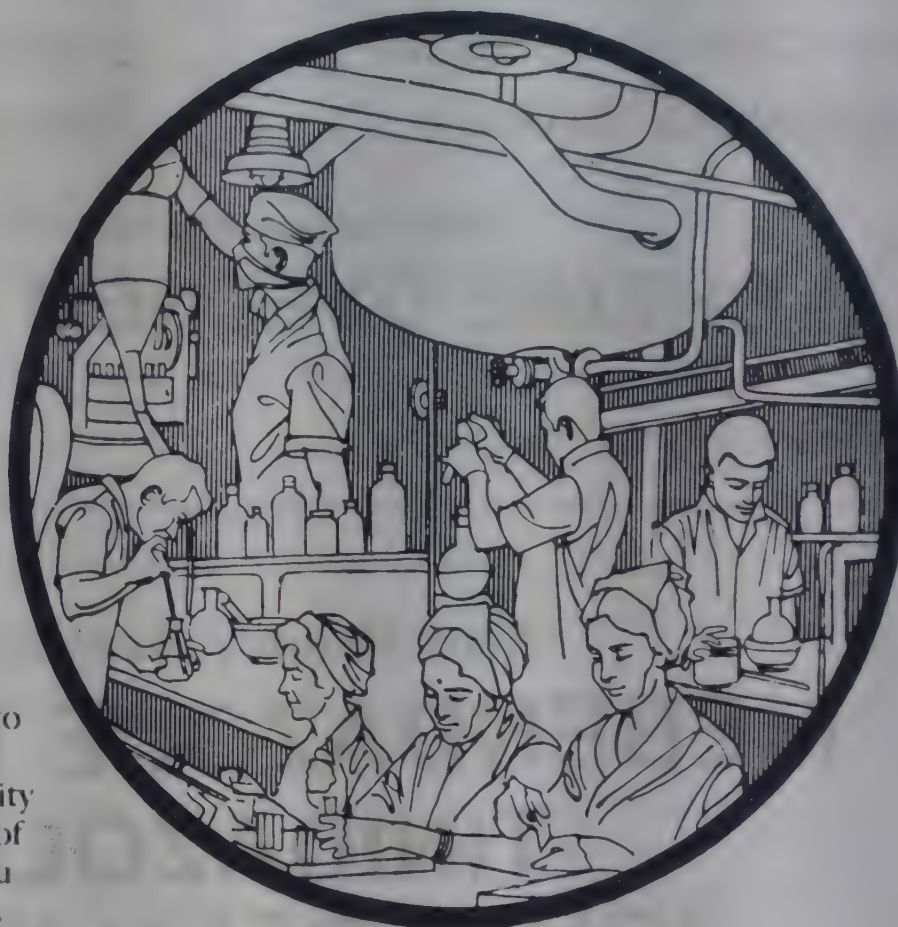
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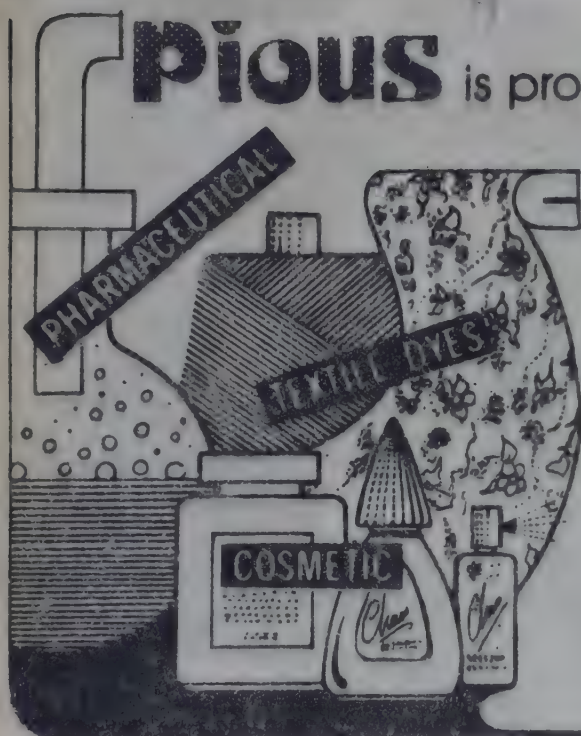
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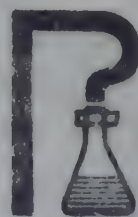


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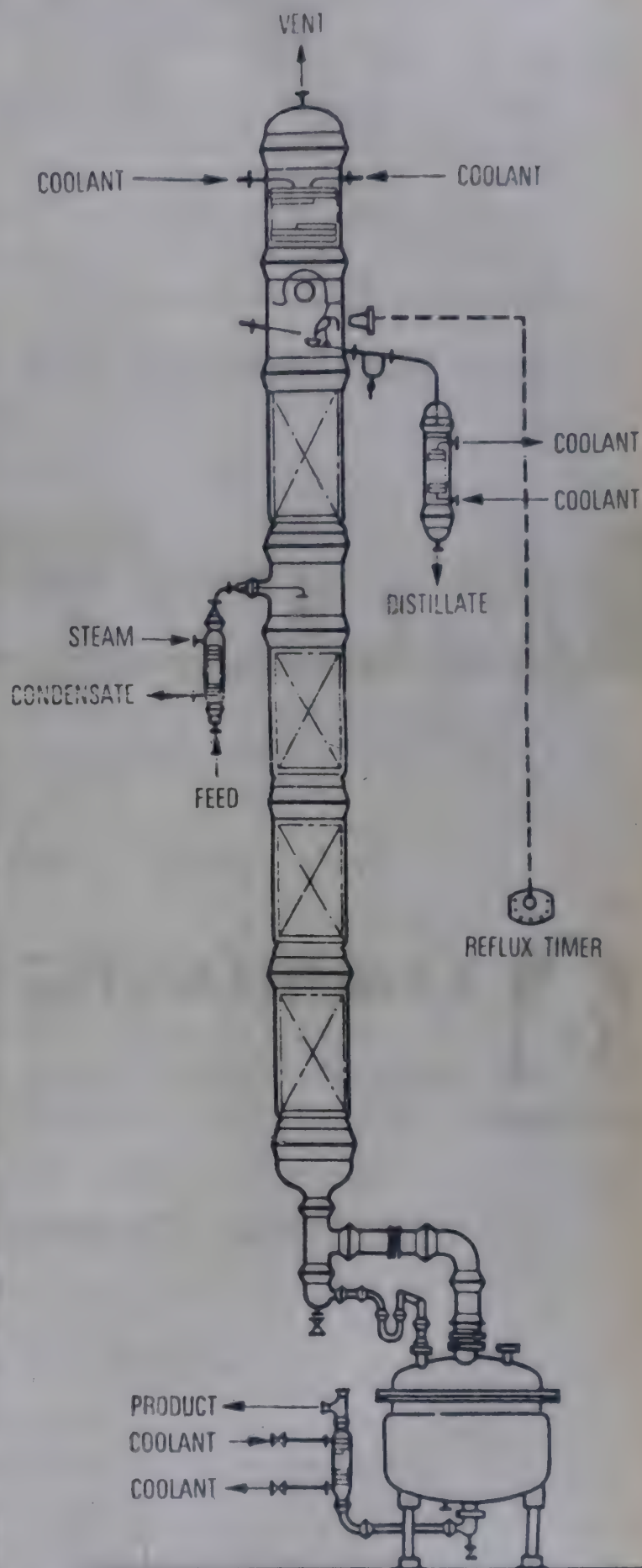
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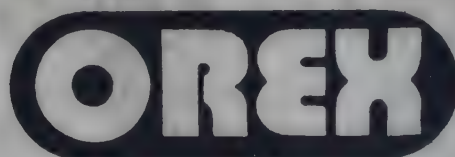
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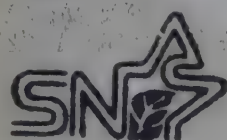
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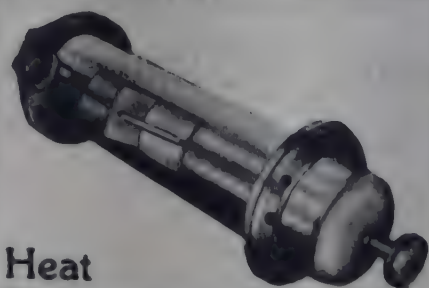
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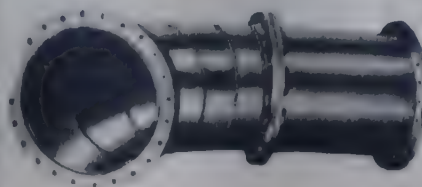
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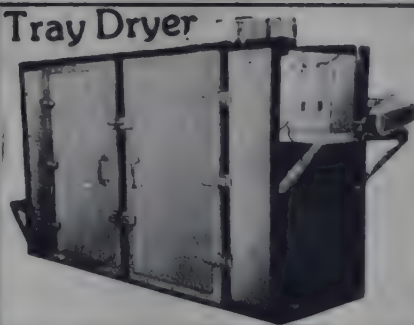
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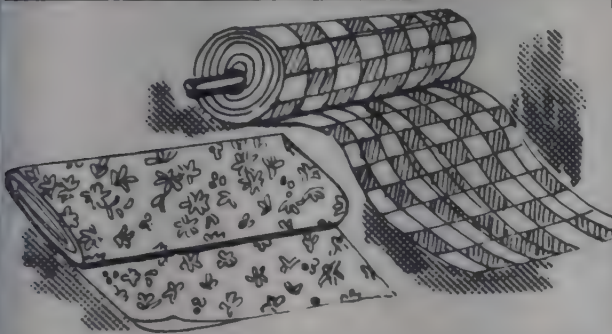
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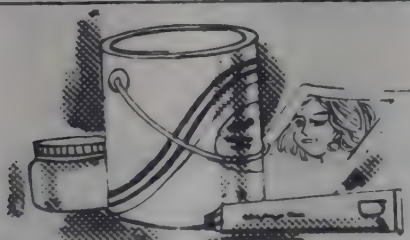
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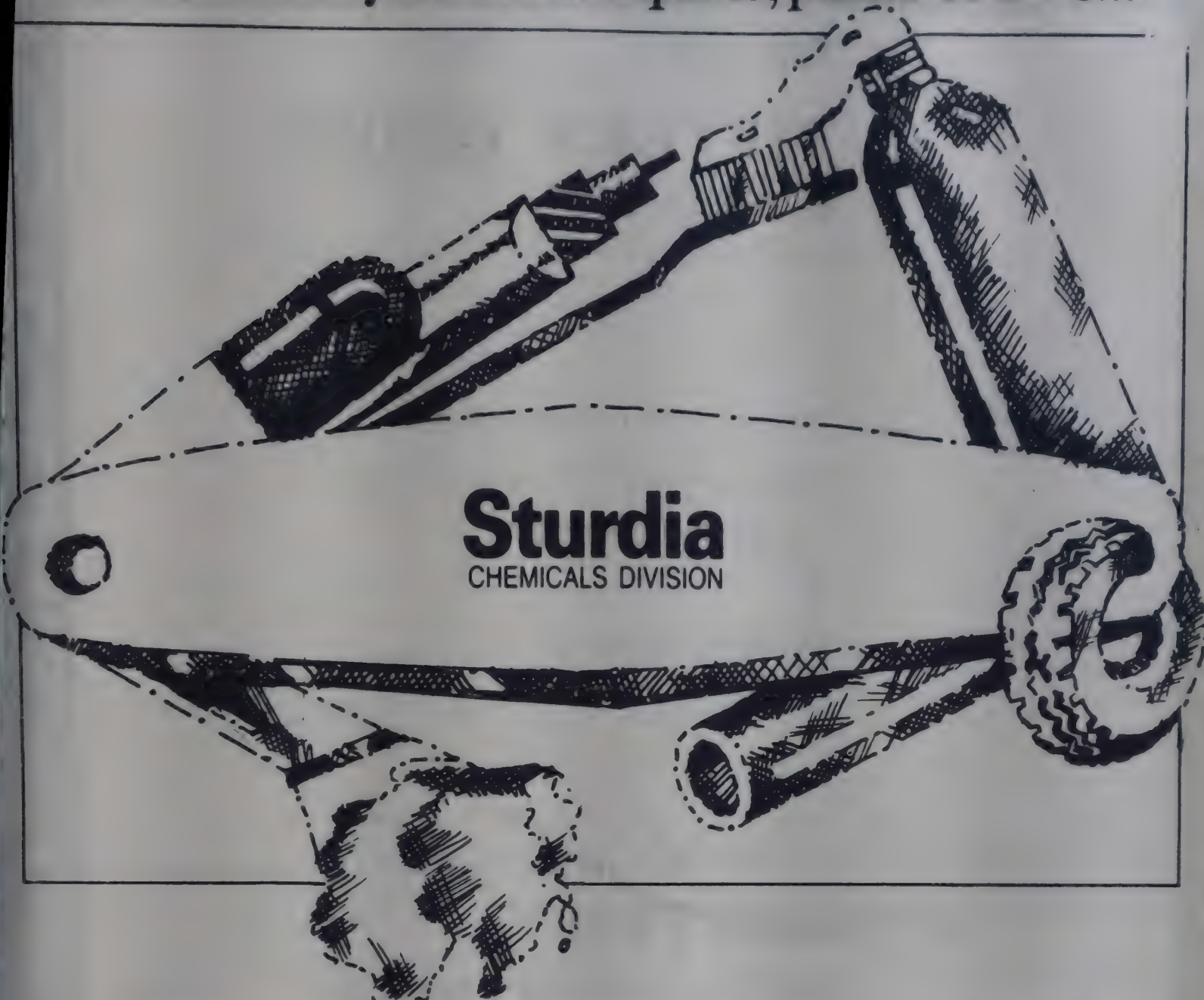
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CHEMICAL WEEKLY

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The Limits to World Oil

Amid these substantial shifts in world energy trends in recent years, one has remained consistent: World oil reserves are being depleted. This simple fact has been effectively obscured by euphoria over rising petroleum production outside of OPEC. These increases have come largely at the cost of accelerated depletion of some of the world's most limited and strategically important oil reserves, and they cannot continue much longer.

It is time to recognize that the oil glut is real and likely to be protracted, though by no means permanent. Fundamental changes mean that declining prices and falling demand for OPEC oil may be key features of the world energy scene for several years. Energy problems have not disappeared, but they have shifted, and new strategies are needed. The challenge is to sustain the positive momentum away from oil that has developed in recent years and, amid conditions that make complacency all too easy, to prepare for a time when oil will be far more expensive.

The long-term outlook remains dominated by Middle Eastern members of OPEC, which have 56% of the world's known petroleum reserves. In fact, recent shifts in world oil markets have some rather disturbing long-term implications: the rate of depletion of the world's most abundant oil resources has slowed, while depletion of some of the scarcest and most strategically important reserves has accelerated. At the 1984 extraction rate, U.S. proven reserves will last only about nine years.

The ability to predict on availability has improved enormously in the past few decades, due to advances in petroleum geology as well as extensive drilling throughout the world. A range of 1,600 billion to 2,400 billion barrels encompasses all but the most extreme oil resource estimates of the mid-eighties. Of this total, 554 billion barrels have already been used up; 700 billion barrels of additional proven reserves have been discovered. This leaves a range of between 350 billion and 1,150 billion barrels of oil remaining to be found.

Several OPEC countries with limited reserves are now producing at near maximum capacity in order to sustain their economies, while Persian Gulf countries with the largest reserves are restricting production in order to support OPEC prices. During the nineties, oil production is almost certain to decline in such OPEC nations as Algeria, Ecuador, Gabon, Indonesia and Nigeria. None is likely to remain an oil exporter past the mid-nineties. During the next 10 years, OPEC may well become a smaller, more geographically concentrated organization and a more powerful one.

Additions to world oil reserves after mid-century came principally from the Middle East, where reservoirs vastly larger than those found elsewhere were discovered. Between 1970 and 1977, global reserve figures were sustained by more modest discoveries in the Middle East and by

other discoveries in Alaska, the North Sea, and Mexico. But since the late seventies, annual additions to proven reserves have sometimes not even been sufficient to replace the oil extracted. Recent increments have resulted mainly from continued exploration of already established reservoirs in major oil-producing regions.

At the 1985 rate of consumption, the ultimate depletion of global oil resources is between 50 and 88 years away. Little of the world's petroleum is likely to remain by the bicentennial of the world's first oil well in the year 2059.

More than three quarters of the world's sedimentary areas have been explored, and results confirm a key hypothesis on which oil resource estimates are based: almost 90% of all the oil is found in just 25 of the world's 600 identified sedimentary "provinces" or regions. Given their geology, such provinces are easy to target as potential producers, and within them petroleum is concentrated in large fields that are found quickly. Over two thirds of the oil discovered so far is in just 7 "giant provinces". And almost half is in the world's only "mega-province" — located in the Middle East. Once the large early finds are made, discoveries tend to drop off quickly. Richard Nehring of the Rand Corporation believes that only about 10% of the world's petroleum lies in small or very small fields.

The largest oil discoveries of the seventies — in Alaska, the North Sea, and Mexico — have added significantly to the world's inventory of proven reserves. By historical standards, however, these are modest in size and so have added little to estimates of ultimately recoverable reserves. Even before this oil was discovered, analysts assumed that such quantities would be found, although they were not sure exactly where.

The world's largest oil producer — the Soviet Union — is also one of the largest question marks. The oil industry is a high priority of the Soviet Government, and, as in the West, investments in petroleum rose during the early eighties. Oil drilling increased from 50 million feet of wells in 1979 to 90 million feet in 1984, and production rose by more than a half million barrels per day. Reserve additions have come relatively slowly in recent years, however, and in 1984 and 1985 Soviet oil production declined for the first time since World War II.

The Soviet Union is heavily dependent on relatively old and declining oil fields and is plagued by difficulties in opening new production frontiers. The key producing area of Tyumen in West Siberia, which provides 63% of Soviet Oil, has fallen below official targets for the past three years, and many fields are producing as much water as petroleum. Since the Soviet Union now produces more than one fifth of the world's total, any significant decline in Soviet production will have an impact on oil markets worldwide.

North Sea oil is one of the largest and most welcome additions to world supplies in recent years. Oil production by the major North Sea producers, Norway and the United Kingdom, reached 3.3 million barrels per day in 1984, greatly easing Europe's dependence on imported petroleum. Exploration and development efforts are continuing in the North Sea, but reserve additions have been modest in recent years as companies turn to fields that are much smaller than those developed initially. Even without further price decreases, North Sea oil production is projected to peak before 1990 and decline steadily during the nineties. Some North Sea fields have exploration and development costs as high as \$20 per barrel, among the highest in the world. Industry officials believe that an additional \$2 decline in the world price of oil could make a number of North Sea projects uneconomical.

Mexico has also added to world oil supplies. Production grew steadily in the late seventies, reached 3 million barrels per day in 1982, and has stayed at about that level due to weak demand and a government decision to produce at less than capacity. Mexico's oil resources were developed relatively recently, and its proven reserves of 48 billion barrels are 40% higher than those of the United States. Worldwide, only Saudi Arabia, Kuwait, and the Soviet Union have more oil than Mexico does. Some analysts believe that Mexican oil production will rise from the current 3 million barrels per day to 4 million barrels before production peaks in the mid-nineties. However, rapid growth in Mexico's internal oil requirements will probably keep the country from ever exporting much more than the current 1.5 million barrels per day. Unless the Mexican Government takes action to restrict oil use, the country could easily become a net importer by the year 2000.

China is another key country in the world oil equation. Production there grew significantly during the fifties and sixties, but then leveled off at about 2 million barrels per day in the late seventies. Major efforts were then launched to open new oil fields, particularly offshore in the South China Sea and the Bohai Gulf. No sizable reserves have been found so far, but many promising areas remain to be drilled and the Government has redoubled its efforts. Oil is important to China's ambitious modernisation program, and major finds will be necessary simply to maintain the current production level. China's remaining petroleum reserves of 19 billion barrels equal only 19 barrels per person. At the U.S. rate of per capita oil consumption, China's oil reserves would be gone in 10 months. Incredibly, in order to earn precious foreign exchange China has managed to remain an exporter of about 1 million barrels of oil per day. This leaves just one third of a barrel of oil per capita to be used each year domestically.

Petroleum exploration was started or stepped up in at least 30 additional countries during the past five years. Many of these efforts involve Third World Governments, Multinational Corporations, and Financial Assistance from Western Banks or Multilateral Organisations such as the World Bank. The biggest success stories are in Colombia, where oil production was expected to reach 400,000 barrels per day by 1987, and Brazil, which has similar potential. Other countries with smaller discoveries include Angola, Argentina, Australia, Cameroon, Egypt, India, Malaysia, Pakistan, Peru, Syria, and Zaire. Thanks to exploration efforts stimulated by the oil price increases of the seventies, these countries have the potential to one day become self-sufficient in oil.

Together, these discoveries have increased global oil reserves less than 1%, however, and at their peak they will provide only an additional 1-2 million barrels per day of oil. John Lichtblau concludes: "Production increases can of course be expected from a number of other non-OPEC countries, such as Egypt, Brazil, Colombia, India, and West African coun-

tries. But there is nothing in sight which would compare even remotely with the developments of the 1970's. Most developing countries remain desperately short of oil.

Saudi Arabia's oil reserves, on the other hand, would last almost 50 years at the 1984 rate of extraction. Many Middle Eastern oil fields have production costs of less than \$2 per barrel, whereas some Alaskan and North Sea oil fields yield oil at a cost of \$20 per barrel. Charles Ebin, an energy analyst at Georgetown University's Center for Strategic and International Studies, believes that as non-OPEC oil production declines, OPEC's share of the world oil market will reach 55% in the nineties, about the record levels reached in the late seventies.

Non-Middle Eastern Oil Production is approaching its peak. By 1990, at the latest, declining oil production in the United States, the Soviet Union and the United Kingdom will greatly outweigh increases in such countries as Brazil, Colombia, and Mexico. These trends should raise warning flags for anyone tempted to celebrate the demise of the Persian Gulf Oil producers. Recent independence from Middle Eastern petroleum provides a false sense of security since it has occurred largely at the expense of greater long-term dependence. The lower the current Middle Eastern share of the market, the greater its share at the end of the century, when many countries will be running out of oil. The danger is that the Persian Gulf may again hold all the cards just when world oil resources are more limited than at any time in recent history.

The main challenge is that oil prices are likely to continue falling in the years ahead, sending consumers a message that could eventually lead to higher oil consumption and a future crisis. As in the early seventies, oil's price may drop below its long-term replacement value in many countries. This would undermine energy efficiency investments and the development of indigenous energy sources. In the next few years, energy investments in many countries may be unable to compete in cost with Middle Eastern Oil, which still comes out of the ground for only a few dollars a barrel. Policymakers so far have focused mainly on the possibility of taxing imported oil, which would insulate domestic energy markets from international competitors but not interfere with the choice between indigenous energy sources.

Energy efficiency standards are also needed to supplement market forces in the next few years. The purchase of an automobile or a major appliance such as a refrigerator effectively commits a person to a particular level of energy consumption for 5-20 years, during which time the cost of energy may shift repeatedly. Consumers often have no way of knowing what those charges will be, and they cannot always afford the up-front costs of making sound, long-term investments. In several countries, most notably Japan, Governments have required that manufacturers of automobiles and major appliances meet efficiency standards. Many of these are now outdated; others are about to expire or have been relaxed under industry pressure. Efficiency standards should either be extended and toughened or replaced with financial incentives that encourage sound energy investments. Sales Taxes based on the energy requirements of particular appliances would provide manufacturers and consumers more flexibility and might in the long run stimulate development of more-efficient technologies. The key to optimising energy efficiency is to provide an economic signal but allow manufacturers and consumers to make the final decisions about what is produced and bought. The key test is whether the political will for such change can be mobilized in the absence of an immediate crisis.

— T.P.S. RAJAN
(Source: Chapter 5 from the 'State of the World 1986', Christopher Flavin, on "Moving Beyond Oil").

CHEMARENA

J.L. VENKITESWARAN

Ethylene Supplies tighten in USA

We had referred (see *CHEMICAL WEEKLY* issue dated 19th January 1988) to some contradictory forecast on the need for additional ethylene capacity in USA and now the situation confirms that more production is urgently needed and prices have gone up by 15% to a level of 35 cents/kgm. Further price increase is expected and plants are said to be operated at over 95% of the nameplate capacity of 35 billion pounds. Production and consumption are at about 33 billion pounds. 50% goes to polyethylenes and 25% into other polymers with the balance into other chemicals. The usage for polymers in the first half of 1987 is reported as given in Table and the balance of 6 billion pounds ends up as linear olefines, alcohols and ethylene oxides.

There is considerable uncertainty on forward contracts as maintenance shut-downs tend to dislocate supplies. More producers are going in for debottlenecking and slight increase in production but this cannot meet the situation. The demand for propylene has also risen

TABLE
ETHYLENE CONSUMPTION -- Billion lbs

For Product	1st Half 1987	% of Share
LDPE	4.46	25.9
HDPE	4.13	24.0
Ethylene Oxide	2.56	14.9
Vinyl Chloride	2.18	12.7
Ethyl Benzene	1.23	07.1
Others	2.66	15.4

sharply and its price is even higher than for ethylene to a level of 40 cents/kgm for polymer grade. Butadiene prices have also jumped to 66 cents/kgm and the result could lead to a shift away from ethane feedstock, where conditions permit. US is reported to have now become an importer of ethylene from being an exporter, all these years. In short, there is a healthy trend for olefins after some years of poor returns.

Acid Rain Controversy

The issue of acid rain or precipitation of acidic pollutants like sulfur dioxide from the sky along with rain, with serious consequences on lake waters and forest land has been recognised as a serious problem to be tackled through international efforts and understanding. There are several areas in Europe and elsewhere subject to this but more serious is in the North US--Canada area where Canada has been claiming that acid rain precursors of US origin are destroying its lakes and forests. There has not been any agreement on the extent of the effects or source of such acid rain in Canada or the lakes in north USA and studies have been going on. But a recent report by the National Acid Precipitation Assessment Programme (NAPAP) of USA concludes that few lakes and streams in US have been damaged and that harm to forests, crops, human health has not been demonstrated. It also considers that acidic deposition is likely to have little or no effect on water, vegetation and human health in the next few decades, if

ever. There are said to be great uncertainties in most aspects of acid rain problem and that further research is needed before control measures are justified and there is time enough.

The report has naturally created serious reactions in Canada where the report has been described as out of step with prevailing scientific judgement. Comments go to the extent of suggesting that the data are highly selective and incomplete and more in the nature of political propaganda masquerading as science.

US environmentalists are also not in agreement with the conclusions and feel that though the scientists had toiled for years on various aspects of the acid rain problem the report is slanting towards minimising the seriousness of the longterm problems. There may be more controversy particularly between USA and Canada in the coming months.

Petrol Imports?

There is a report of impending shortage of petrol in the country and the need to import the same. Already a substantial quantity of diesel/kerosene is being imported and we are to add the products of the light end of the oil barrel too. If true, this is totally at variance with projections on oil supply and demand not only by the petroleum authorities but by the experts connected with plans for petrochemicals. The Report of Perspective Plan for Petrochemical Industry records the data (see Table below) on Naphtha availability -- naphtha incidentally being the base for petrol or "mogas".

We are supposed to have a surplus of naphtha after meeting mogas and petrochemical/fertiliser production requirements and this implies ready diversion of distillates to meet any rise in mogas demand. Where is the discrepancy? What is projected is a rise in mogas demand from 3.32 million tonnes in 1989-90 (It was 2.28 million tonnes in 1985-86) to as much as 4.96 million tonnes in 1994-95 -- 50% in five years and a serious dip in availability of naphtha/mogas to 0.3 million tonnes in spite of an additional refining capacity of 11 million tonnes. Actually the above projection of a small surplus is incorrect as it does not take into account the proposed Haldia project (or is this deliberate?). Apparently the estimate of surpluses even in 1989-90 and earlier years is faulty and are we reduced to become an importer of naphtha/mogas from being a regular exporter till recently?

Petrol is undoubtedly the largest source of revenues among petroleum fuels. The increase in the administered price by Re.1 per litre is expected to net about Rs.

250 crores in a full year, and this is perhaps an under estimate for the present level of mogas consumption i over 2.5 million tonnes or 3200 million litres. This is not the real point but far more serious is the basic one relating to our petroleum fuels policy. The past increases in price has not affected consumption levels to any significant extent and there is no reason to expect a different result now. The big jump in production of cars notably Maruti and of two wheelers have led to the steep rise in petrol consumption by the section of the population which is large enough to set the use pattern of petrol. There is no shift in this policy on automobiles and the pressure on demand will continue to build up unless measures other than price increases are considered. Further the big difference in price of petrol and diesel fuels will encourage a shift to diesel with equally unacceptable consequences. The consumption of HSD is reported to have reached 4.89 million tonnes in 1985-86 and going up at over 8.7% a year.

It is known that whatever the nature of promises and potential for indigenous petroleum, the country has to resort to imports at heavy and rising costs in foreign exchange in the years ahead. A reorientation in policy even to the extent of quantitative curbs on consumption requires to be examined and formulated. Certain essential petrochemical projects should not be cut back on the plea of naphtha shortage. Road transport and liquid fuel consumption need a thorough analysis and more increase in fuel efficiency of new vehicles or price increases do not create any significant dent in growth of demand. Nor it is likely that indigenous production levels of petroleum can be stepped up.

TABLE

(in million tonnes)

	Refining capacity	Naphtha + Mogas	Mogas demand	Net Naphtha availability	Existing Fertilizer	users Petrochem	Balance
1988-90	51.6	08.0	3.32	4.68	2.730	1.105	0.8345
1994-95	62.5	09.2	4.96	4.24	8.814	1.102	0.324
1999-2000	96.8	14.7	6.33	8.37	2.814	1.102	0.454

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Capacity output targets for seventh plan : 11 major industries face cuts

The Planning Commission proposes to scale down substantially the capacity and production targets in respect of 11 major industries following uncertainties regarding their growth during the Seventh Plan period.

These include sponge iron, refined copper, nitrogenous fertilisers, some thermoplastics, synthetic rubber, caprolactam and methanol, industrial and professional electronics and tractors.

The commission in its mid-term appraisal of the industrial sector in the Seventh Plan period said that while plan targets would be achieved in most of the important commodities, it would not be possible to do so in some important sectors, necessitating a substantial scaling down.

It said that the main disappointments in the private sector have been the lack of progress in the three fertiliser plants allotted to the private sector along the HBJ gas pipeline, the slow progress in modernisation of the textile industry despite the existence of the Rs. 750 crore textile modernisation fund, and industrial and professional electronics in the electronics sector.

Another industry whose growth may slow down in the future could be the cement industry where demand constraints could restrict further capacity expansions.

The appraisal said that each of these industries are subjected to specific problems leading to lower than expected private investment and production.

As such the government would have to initiate policies and measures that would induce further growth in these sectors of industry. The low growth agro-based sectors may suffer further set-backs owing to the drought in the agriculture sector.

The Seventh Plan had emphasised the consolidation of existing manufacturing capacity rather than a widespread creation of entirely new capacity. Thus, the Plan has laid stress on modernisation and technological upgradation of existing facilities in order to obtain higher production through increased productivity, improved product quality and higher capacity uti-

lisation. Additional capacity is sought to be created by expansion of existing plants wherever possible rather than investment in entirely new greenfield projects.

It said four gigantic new projects will be commissioned during the Seventh Plan. These are the Visakhapatnam steel plant, Maharashtra gas cracker, Nalco aluminium complex and the HBJ gas pipeline along with the linked fertiliser plants. Two other significant commissionings would be the Bongai-gaon petrochemicals complex and the Cochin aromatics complex. All these projects are at contemporary levels of technology.

With the commissioning of the Orissa aluminium complex the country will emerge as an exporter of both alumina and aluminium from present situation of an importer. The commissioning of the gas cracker will more than double the availability of thermoplastic material in the country. The Visakhapatnam steel plant will consume 20 per cent less energy than the existing units. The gas pipeline will spawn a large number of downstream facilities like the LPG extraction plants, fertiliser factories and power stations, it said.

NEW IMPORT-EXPORT POLICY TO REMAIN LIBERAL

The new three-year import-export policy to be announced on April 1 will continue to follow the liberal import regime of the past few years as, according to Commerce Ministry sources, the existing policy has paid rich dividends.

There will, however, be some changes in the policy, conceding partly the point that there had been undue premium on the manufacturing sector and less attention had been paid to the marketing organisations.

The policy makers in the Commerce Ministry favour a review of the export is considered that the incentives, as houses and trading houses policy. It also the measures being presently contemplated by the Government, would give a fresh impetus to the strengthening of the marketing organisations in the country.

In the new import policy, the imports in the high-tech areas are ex-

pected to continue and wherever technological upgradation or modernisation is concerned, the new policy will stand in the way.

The new policy is expected to create conditions for motivating a movement for a quantum jump and quality leap in products and services for export as a concerted drive for cost-effective imports and value-added exports.

The objective of the new policy will be to bring about a drastic reduction in the medium-term and creation of trade surpluses in the long-run.

Another important matter engaging the attention of the Centre is to involve the State Governments more and more in the export promotion effort. However, in the absence of data on the origin of exports, it is unwise to link incentives to exports of different States.

In this context, the work in the Commerce Ministry is extremely difficult as its role mainly is that of persuasion with the other branches of the Government, Central and State. The problems relating to revenue considerations come in the way of export promotion.

There has been criticism of indiscriminate imports taking place, but the Commerce Ministry sources clarify that at least 50 per cent of imports comprise bulk items like crude oil, fertilisers, edible oils, sugar, steel, power and non-ferrous metals. Eight to 10 per cent of imports are tied up to aid and the rest cater to the needs of technological upgradation and modernisation of the industry.

CARBON BLACK KNOWHOW DEVELOPED

Indian scientists have made high quality carbon black, used in paint and printing ink, from natural gas.

'Carbon black, also known as channel black, is produced by utilising low pressure natural gas which is flared. It has been developed by scientists of the Regional Research Laboratory, Jorhat, Assam.

Four million cubic metres of gas is being flared each year in the northern region alone.

The quality of carbon black produced indigenously almost matches international standards, scientists of the laboratory, led by Dr. R. C. Borah claim in a paper published in the journal of council of scientific and industrial research "Research and Industry."



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TRADE MARGINS FOR CHEMISTS:

Daytime fee move dropped

The government may drop the controversial proposal of the Kelkar committee to introduce a fee of 50 paise on every prescription handled by the retail chemicals during day time, it is learnt. It will however retain the prescription fee of Re. one during night.

An agreement was reached between the pharmaceutical trade and industry on trade margins and prescription fee at a meeting called by the Kelkar committee in December last. The government was to incorporate these provisions in the Drug Price Control Order.

It is learnt that the government has received strong objections to the committee's proposal for a fee for handling prescriptions during day time from a number of consumer organisations and physicians bodies in the last few weeks.

Informed sources say that these representations and the fear of a possible uproar in the Parliament, (scheduled to start on February 22) on the issue have unnerved the officials in the department of chemicals and petrochemicals. It is pointed out that in many cases a patient has to go to more than chemist to get all the medicines listed in a single prescription. This would mean additional burden of at least Re. one on a patient.

The sources also say that with an all round increase in the prices of most of the medicines marketed in the country following the implementation of the new DPCO, and additional levy on patients is unjustifiable.

A decision to drop the proposal on prescription fee at this stage is likely to be opposed strongly by the retail chemists. It is to be recalled that the retail trade margin was brought down to a uniform rate of 15.5 per cent for price controlled formulations in December meeting from the originally fixed levels of 17 per cent for ethical drug formulations and 15 per cent for non-ethical drug formulations in the new DPCO.

The joint meeting of pharmaceutical trade, industry and the Kelkar committee had to agree to this compromise formula in the December meeting, because of the lower wholesalers' margin of 3 per cent for ethical drugs

and 2 per cent for non-ethical drugs in the new DPCO.

The newly proposed retail margin of 15.5 per cent is however higher than the margins allowed under the 1979 DPCO. The retail margin was 12 per cent for ethical drugs and 10 per cent for non-ethical drugs.

CDRI TO RELEASE NEW DRUGS SOON

The Central Drugs Research Institute, a premier drug laboratory under the Council of Scientific and Industrial Research, is expected to shortly re-release several drugs and vaccines.

According to a CDRI spokesman, the institute aims at reducing and ultimately removing the country's dependence on medicines from developed countries.

The institute, till recently was the subject of some criticism for not producing any drugs.

Last year, the institute released the first batch of four new products (three drugs and a filariasis diagnostic kit), two of which have already appeared in the market.

In addition, a female contraceptive pill has been permitted by the drugs controller (India) for limited marketing while an amoebiasis diagnostic kit is expected to appear in the market by the end of the year.

The contraceptive pill has also been found to be useful in the treatment of breast cancer and is expected to be marketed by 1989.

Other drugs expected to be released are a neuromuscular blocking agent by the end of the year, an adjuvant for use with anti-fertility vaccine by 1989 and a less toxic derivative for treatment of malaria by 1990.

Several other products including anti-leprosy and cholera vaccines and the biopesticide derived from bacillus sphaericus are also expected to be marketed by 1990.

Concerted efforts by the institute have now led several compounds to be in advanced stages of development which otherwise may not have been possible as the discovery of a new drug and its development to a marketable drug takes more than 13 years.

VJTI CENTENARY

As a part of Centenary Celebrations the Technical and Applied Chemistry Department, VJTI, Matunga, Bombay-400 019 has arranged a Seminar on 'Textile Processing-Prospects and Retrospect' on Monday 28th March 1988 at Hotel Sea Bock, Bandra, Bombay-400 050. All the past students of this department who have obtained Diploma in LTC (DB) as well as other alumni of the department and Technicians working in the Textile mills and Processing houses may contact for details:

Dr. K. H. Sadri,
Head, Tech. & App.
Chem. Dept., V.J.T.I.,
Bombay-400 019.
Tel: 4123231

NAYE PLEA ON BUTACHLOR IMPORT

The National Alliance of Young Entrepreneurs (NAYE) has urged the ministry of chemicals not to dilute the existing policy of import of butachlor technical, which is the raw material for butachlor 50 EC, a herbicide used by farmers, either by restricting the imports or canalising such imports through Hindustan Insecticides Ltd.

Any decision to restrict imports or to canalise through HIL which itself is in the process of setting up a butachlor technical plant will further aggravate the indigenous price thus seriously affecting the interests of the farmers and the small scale units.

SAARC WORKSHOP ON HERBAL DRUGS

A four-day SAARC workshop on cultivation and processing of medicinal and aromatic plants began at Lucknow on Feb. 9, with a call for interaction among member countries for the development of low cost herbal drugs.

Inaugurating the workshop, the Union Scientific and Industrial Research Secretary, Dr. A. P. Mitra, who is also the Director-General of the Council for Scientific and Industrial Research, said programmes should be chalked out in which scientists from each SAARC country could come to India and work with their counterparts in Lucknow on such project.

Methanol-based acetic acid project opposed

All-India Alcohol-based Industrial Development Association (AABIDA) has criticised the grant of letters of intent for the manufacture of acetic acid from methanol, saying "there is neither any merit nor any justification for putting up methanol-based acetic acid plants in the country."

In its submission to the Central Molasses Board, AABIDA has pointed out that there are 22 widely dispersed alcohol-based acetic acid units with an installed capacity of over one lakh tonne against the current effective demand of around 70,000 tonnes and a potential demand of about 90,000 tonnes.

AABIDA sees no justification for allowing methanol-based acetic acid plants which would involve huge investments of over 40 to 50 crores. Investments of such magnitude are uncalled for when the demand for acetic acid can be met effectively and easily by existing units and their planned expansion.

While the existing units using alcohol produced an average 5,000 tonnes per year, Lis have been granted to two parties to produce over 50,000 tonnes, which exceeds the current acetic acid consumption in the country. As the world's largest producer of molasses alcohol, it is unwise for the country to opt for the methanol route which would increase consumption of the scarce petroleum resources, AABIDA feels.

"While we as an association are always alive to the development of new technologies and new processes, one has also to keep in mind the implications of such proposals and technologies which are not suitable to the country's economy and are likely to have far-reaching repercussions on the investments already made and the employment potential have to be kept in mind before taking a final view on such matters," it said.

The alcohol situation has now eased and almost all the organic chemicals

based on alcohol are now available in adequate quantities and some are available in plenty. Therefore, import of organic chemicals under OGL is no longer justified, the association submitted.

AABIDA recalled that when the Government decided to recommend the setting up of alcohol-based industries in the mid-1950s, apart from the primary objective of utilising molasses for gainful uses, the most important consideration was that the medium-scale alcohol-based chemical industries could be set up with comparatively moderate investments and could be well-dispersed all over the country. This policy contributed to India becoming a pioneer in alcohol-based industries which were set up in different States all over the country during the last three decades. An investment of over 300 crores has been made with direct employment of over one lakh people and indirect employment to over two lakh people.

"This approach of medium-sized alcohol units widely dispersed over the country and with a moderate investment of a few crores is most healthy for our economy," AABIDA submitted. Such medium-sized units are to be preferred to proposals for a few large-sized monolithic units at a few locations involving massive investments, it said, referring to the plans for methanol-based acetic acid units.

AABIDA welcomed the new molasses-alcohol policy announced in September 1987. Although it did not meet all the demands of the association, the policy contained several measures for the promotion of alcohol-based industries. The Government had to choose between two extremes — demand for total decontrol of molasses made by a section of the sugar industry and a very steep hike in molasses prices sought by another section of the industry.

"The Government achieved, by and large, a satisfactory mean, keeping in view the supreme importance of maintaining the viability of alcohol as an industrial feedstock", it said.

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States told to regulate industrial alcohol levies

The Union Government has asked the States to regulate their levies on industrial alcohol in such a manner that the total incidence is not more than 25 per cent or 50 paise out of the control price of alcohol.

Simultaneously, it has made ad hoc allocations of alcohol for the first quarter of the 1987-88 alcohol year (beginning from December). Both these decisions are aimed at ensuring availability of alcohol for the chemical industries using this as their raw material at reasonable prices without the burden of high levels.

The Union Industry Minister has written a letter to Chief Ministers of all the States asking them to review the existing levies on alcohol including export pass fees, which are levied on transfer of alcohol from one State to another. The current price of alcohol is around Rs. 2.30 per litre, which was revised upwards from Rs. 1 per litre with effect from October 1, 1987.

The high incidence of levies has not only made the raw materials for the chemical industries costlier, but has also hampered easy movement of alcohol from surplus States to the deficit ones. This factor had, about two years ago, forced the Centre to even allow duty-free import of alcohol although the country as a whole had adequate alcohol.

For instance, Uttar Pradesh had imposed levies at the rate of Rs. 10 per litre for potable alcohol and Rs. 2 per litre for industrial alcohol. This was subsequently reduced to Rs. 5 per litre and Rs. 1.25 per litre, respectively.

Besides the Industry Minister asking the States to impose a limit on levies on alcohol, the Central Molasses Board, which is a statutorily created body, has also requested the States to freeze levies and duties at the level prevailing in May 1983 for alcohol meant for industrial use.

According to the Central directive, the export pass fee should also not exceed 50 paise per litre of industrial alcohol. These directives, if implemented, are expected to reverse the recent trend of declining consumption of industrial alcohol and an increase in the molasses availability.

As regard the ad hoc allocations for the first quarter of 1987-88 (December 1987-February 1988) to enable the deficit States to meet their requirements of industrial and potable alcohol. The ad hoc allocations are equivalent to one-fourth of the total allocations made during the preceding year.

As per these allocations, Uttar Pradesh will be supplying 40 lakh litres, Maharashtra 22 lakh litres, Tamil Nadu six lakh litres and Bihar will supply 12 lakh litres of industrial alcohol to the deficit States. The total ad hoc allocation is estimated at 80 lakh litres.

The major deficit States, which have been earmarked to get alcohol from the surplus States in the first quarter of 1987-88 include, with quantity of allocation given in brackets: West Bengal (40 lakh litres of which 30 lakh litres from UP and 10 lakh litres from Bihar), Gujarat (12 lakh litres from Maharashtra), Karnataka (nine lakh litres of which four lakh litres from Maharashtra and rest from Tamil Nadu) and Andhra Pradesh (3.5 lakh litres from Maharashtra).

UP REDUCES EXPORT PASS FEE ON ALCOHOL

The Uttar Pradesh government has reduced the export pass fee on industrial alcohol to 50 paise from Rs. 1.25 per litre with immediate effect, it is learnt.

Both UP and Maharashtra, two surplus states, have been charging an export pass fee of Rs. 1.25 per litre on purchase of alcohol by chemical units of other states.

The decision of the UP government appears to be a sequel to the Centre's warning to these states last week that duty-free import of alcohol will be allowed again to the chemical units of the deficit states if the surplus states did not reduce the export pass fee.

The Maharashtra government has not however announced a reduction in the export fee so far. Both the states are reportedly nursing huge stocks of industrial alcohol since last year as no units in the deficit states were lifting alcohol from these states.

According to informed sources there is a surplus of nearly 400 lakh litre of alcohol in Maharashtra alone and the stocks are expected to build up further in the coming months when sugarcane crushing is in full swing.

SEMINAR ON 'OPPORTUNITIES FOR PETRO-CHEMICAL INDUSTRIES IN TAMIL NADU'

A one-day seminar on 'Opportunities for Petro-Chemical Industries in Tamil Nadu' is being organised by the Directorate of Industries and Commerce, Madras, Madras Refineries Ltd. Tamil Nadu Industrial Development Corp. Ltd., on March 5, 1988 at Madras.

Three Sessions

There will be an inaugural session and two technical sessions and thus will be on the following areas:

- Strategy for development of Petro-Chemical Industries in Tamil Nadu.
- Oil prospects in Cauvery Basin.
- Growth potential for Petro-Chemical Industries in Tamil Nadu.
- Environmental impact of Petro-Chemical Industries in Tamil Nadu.
- Water requirements for Petro-Chemical Industries.
- Power availability for Petro-Chemical Industries.
- Planning for Land use in Petro-Chemical Industries.

The Seminar will be attended by experts in various fields of specialisation, top officials of the Central and State Governments, Public Sector Undertakings and representatives of leading corporate bodies.

Participation is invited from entrepreneurs, industrialists, corporate bodies etc.

For further details contact: Directorate of Industries & Commerce, Chemical Wing, Guindy, Madras-600 032.

'GUIDELINES FOR INDUSTRIES' RELEASED

The Union Industry Ministry has released the revised and enlarged edition of "Guidelines for Industries-part I Policy and Procedures". It contains the latest information of Government policies and procedures regarding industrial licensing and foreign collaborations up to the end of 1987.

The guidelines comprise the following section-policy and procedures, documents on industrial licensing policy, statutory enactments and orders, press notes and forms and lists.

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Commercial production of K.G. basin gas begins

Commercial production of natural gas has begun in the Krishna-Godavari Basin in Andhra Pradesh. ONGC has started supply of 28,000 cubic metres of gas to a paper mill in Bhimavaram in West Godavari district.

The gas is being supplied from the wells around Narsapur and Razole through a pipeline laid by ONGC. A storage facility has been set up at Narsapur to maintain constant flow of gas to the consumers.

A press release issued by ONGC at Hyderabad, stated that at least eight chemical and agro-industrial units would get about 1,39,000 cubic metres of gas per day from this facility. In addition nearly half a million cubic metres of gas is to be supplied to the State Electricity Board (APSEB) for power generation during 1988-89. APIDC is also planning to utilise the gas for production of ammonia, urea, methanol and sponge iron, the note added.

In the next three years, the K-G Basin will be developed to supply three million cubic metres of gas per day to various users in the region.

Outlining the results of sustained exploratory efforts by ONGC that led to identification of several prospective areas in the basin, the release said that onland gas has been struck at Razole, Pasarlupudi, Bhimnapalli, Amalapuram and Kaza. Discovery of oil at Kaikalur in the K-G onshore has brought in a new dimension to the geological features.

As on January this year a total of 63 wells have been drilled which included 29 onland and 34 offshore. Out of the 71 prospects in the basin, 43 prospects have been tested, 18 onland and 25 offshore.

ONGC has decided to put on early production system (EPS) the prospects in the K-G Basin. EPS has been introduced as an innovative measure to bring a hydro-carbon strike in pro-

duction, without waiting for the development of the complete infrastructure facilities.

This not only aided early assessment of the reservoir well potential but also helped generation of revenues. In ONGC 26 discoveries have been put on EPS out of which 25 are onland and one offshore. Kaikalur-I has already been put on EPS and has so far produced about 10,000 barrels of oil.

The Seventh Plan programme for the K-G Basin includes completion of 46 wells (36 onland and 10 offshore), 17,213 slk of seismic surveys (6,075 slk onland and 11,138 slk offshore). An expenditure of approximately Rs. 447 crores is expected to be made on exploratory efforts in this basin during the Plan period.

It is planned to use seven more rigs in the area. A task force has been constituted by ONGC to develop the GS-16 structure (offshore). The immediate plans include drilling of four additional wells and this structure is expected to contribute to a production potential of 20,000 barrels of oil per day — equalling one million tonnes per annum and estimated to cost Rs. 200 crores in foreign exchange.

Production is expected to begin from this structure by the end of this year, the press release added.

MRL AROMATICS PROJECT: DECISION SOON ON CO-PROMOTER

The Centre is expected to take a decision shortly on the selection of a co-promoter for the aromatic project to be set up by the public sector Madras Refineries Ltd. (MRL).

In an informal chat with "Financial Express", Mr. M. Arunachalam, Union Minister of State Industrial Development noted that the Centre was keen to expedite the implementation of the prestigious project, estimated to cost Rs. 1000 crores.

Stating that three industrial groups in the private sector — SPIC, Reliance

and JK — were in the race along with IPCL to join hands with MRL, the Minister said that one of them would be selected as a co-promoter.

Asked about the proposal to establish an exclusive bank for the sector, Mr. Arunachalam said that a number of associations had favoured it and the Government was also giving a serious thought to the proposal in order to improve the credit availability to units.

While he was reluctant to go into the details of the bank, the Minister dropped enough hints that an announcement was likely to be made in the new Budget.

Mr. Arunachalam, who recently visited Ivory Coast and came back with officials and private industrialists mentioned that the two African countries enjoyed abundant scope for technology transfer, joint ventures and direct export.

For long, they depend on foreign technology, but now the two developing countries had opted for Indian technology because of its relevance to local conditions, he explained.

More agro-based industries could be started in the countries, which are mainly depending on agriculture. The expanding rural market has more potential. Indian businessmen appreciate the investment climate there, the Minister said.

During the visit, quite a few proposals came up for discussion. A major order bagged by the team was for promoting a Rs. 60 crore railway coach project in Ivory Coast. The project Construction Corporation would execute the project.

Punjab Tractors would also put up an assembling unit in the country providing opportunity for about 20 to 30 ancillaries, the Minister said.

Explaining the thrust areas for export, he said that products like pump, electric motor and diesel engine could be easily marketed in the countries.

To highlight the Indian industrial capacity, a big fair would be organised in Cameroon by TFAI from March 1 to 20. While the country wanted the Indian Embassy office in Ivory Coast proposed to have its office in Delhi to improve the communication between the countries.

port boost incentive for large houses likely

The Union government is considering the possibility of providing some incentives to large houses, besides encouraging trading houses to play a meaningful role in export promotion on the lines of Japanese trading houses.

Sources in New Delhi point out that the Union government is also considering the possibility of raising the existing subsidies for promoting exports. Indications are that these decisions will be reflected in the import-export policy which will be announced in another two months.

In the case of large industrial houses, in particular, the common refrain had been that their contribution to exports has been negligible. At one time, it was even suggested in some quarters that the large houses should be penalised for not exporting much.

This view, it appears, has given way to the need to encourage the large houses to promote exports. This, it is felt, is perhaps the best means of motivating them. No amount of compulsion or force can make these firms export. Therefore, the government is examining the possibility of making exports sufficiently attractive for these firms.

Yet another proposal, which is currently being examined, relates to the provision of incentives to smaller exporters. The idea, it appears, is that the exporters must be given recognition.

In this context, the report on trading houses, submitted by Mr. Kalyan Bannerjee, chairman, Exim Bank, also assumes great importance.

Based on this report, the Union government is expected to come out with a review of its policy on export houses and trading houses. The feeling is that specific trading houses, at least, will be given all the required assistance which may help them in expanding their role considerably as far as exports are concerned, even in the world market.

In essence, the marketing organisation concerned with export promotion would be strengthened and given a fresh impetus in the forthcoming import-export policy. Speculation is also rife that some of the trading houses will get the much-needed support for canalising imports as also counter-

In fact, indications of the coming changes could be gleaned from the recent speeches of the commerce secretary, Mr. A. N. Verma, and Chief Controller of Imports and Exports, Mr. R. Misra, made at a workshop on import-export policy, under the aegis of Economy and Trade, in New Delhi.

COPPER PRICES SOAR

Copper soared on on February 11, in active trading as significant chart-points in both New York and London were broken, dealers said.

Three-month copper grade A closed up £30 from midday, and also up £30 on the day at 1,231. In US dollar terms, it was up \$55 from the official close at 2,154.

Dealers said break above £1,200 afternoon's break above \$2,100 and the New York March future's break above 97.50 cents triggered off a wave of speculative and trade buy-stops.

They said a close above 100 cents in New York will be bullish for the market, driving London up to test the \$2,200 level before the end of the week.

They added that this morning's re-

lease of dec International Primary Aluminium Institute data, which showed a 26,000-tonne fall in total stocks, and general worries over nearby supply tightness, boosted confidence.

Copper futures closed sharply higher following a late session rally that lifted prices to their higher levels in two weeks.

Activity was described as brisk near the close, and quiet for the remainder of the session.

Analysts said technical buying was the major factor in the market, in the absence of any fundamental news. March opened above the key 97.00-cent level, and then broke through resistance at 100 C and 101°C, prompting additional buying.

Traders said the buying was sparked by rallying London Metal Exchange prices, and spread to New York when one commodity fund started buying, which prompted and cover short positions.

One analyst said that the market was in the early stages of recovering from its recent lows, but further gains were needed to cement this uptrend.

Price closed 425 to 520 points higher with February up 425 at 106.25 cents, and Mar up 460 at 101.70°C.

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Paint industry hit by raw material shortage

The paint industry has made impressive strides over the years and touched a turnover of Rs. 1,000 crores in 1986-87. The growth would have been much higher, but for the frequent short supplies of basic raw materials.

The three basic raw materials, titanium dioxide-rutile, titanium dioxide — anatase and linseed oil have all been in short supply in recent times. Moreover, the prices of these raw materials have shot up sizably, according to the Indian Paint Association (IPA).

The price of linseed oil, which was Rs. 12 per kg. in March 1986, is today Rs. 26 per kg. The high prices of linseed oil are attributed to a poor monsoon and demand far exceeding supply. With the next crop due only by the second quarter of 1988, the IPA has, in a memorandum to the government, suggested imports of linseed oil.

Against an annual requirement of 9,000 metric tonne (MT) of linseed oil, the IPA has suggested an import of 3,000 MT to make up the existing shortage. The foreign exchange outgo, if imports are permitted, would be around Rs. 145.25 lakhs.

Another raw material in short supply, according to the IPA, is titanium dioxide — rutile. Against a total consumption of 15,000 MT per annum, the indigenous production is only around 5,000 MT and this solely by the Kerala Mineral and Metals Ltd. (KMM-L). Until 1984, that is, before the KMML went into production, the total requirements of rutile was being imported.

The IPA maintains that the KMML production has always been below capacity. The poor power supply situation in Kerala, coupled with the withdrawal of priority industry status for KMML, has led to the underutilization

of its capacity, according to industry sources.

Against a basic price of Rs. 29 p kg. in the international market, KMM-L's price is around Rs. 48 per kg.

The gap in demand and domestic availability prompted the government to permit imports. But on account of an unprecedented shortage of rutile in the international market, the prices have shot up. From \$1850 per tonne in 1986, it is today \$2250 per tonne. According to the IPA, this increase has had an adverse impact on the cost structure of paint units, which was further compounded by the cascading effect of the customs duty.

Though the government revised the duty structure downwards by 10 per cent in April 1987, still fell short of the paint industries' expectations. The IPA has demanded a reduction of customs duty by abolishing auxiliary duty.

To tide over the present situation, the IPA, in its memorandum, has suggested steps to increase indigenous production. It has stressed the need to see that KMML gets unhindered power supply and also to permit rutile imports under OGL.

Similarly, titanium dioxide — anatase is also in short supply. The only indigenous manufacturer, Travancore Titanium Products Ltd. (TTP), with an installed capacity of 18,000 MT per annum, manufactures only 8,000 MT per annum, according to the IPA.

Anatase is a pigment consumed by the paint, paper and leather industries. With the paint industry alone requiring 8,000 MT per annum, the government had permitted imports through the State Trading Corporation.

With the high price of anatase in the international market and incidence of high duty, the paint industry has not been able to consume much of the imported material, according to the IPA.

To alleviate the problems faced by the small-scale units at least, the IPA has suggested to the government that the imports be made available at reasonable prices and incidence of import duty brought down.

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FILE, ANATASE SHORTAGE:

TTP, KMML deny IPA charge

Mr. A. V. Venkatachalam, chairman and managing director of Travancore Titanium Products (TTP), Trivandrum, managing director of the Kerala Metals and Minerals Ltd. (KMML), Thiruvananthapuram, both public sector, has expressed surprise at the reported statement by the Indian Paints Association (IPA) that the Indian paint industry was hampered by raw material shortage because of the below-capacity production of titanium dioxide-rutile and titanium dioxide-anatase, both basic raw materials in short supply.

Referring to the IPA's claim that against a total consumption of 15,000 tonnes per annum of rutile, the indigenous production was only around 5,000 tonnes solely by the KMML, Mr. Venkatachalam said that since the commencement of production in KMML in January 1985, there had been progressive rise in production. This year KMML is set to achieve a production of 11,000 tonnes rutile. The production in the previous years was 4438,875 tonnes

in 1985-86, 4645.675 tonnes in 1986-87, and 5488.750 tonnes in 1987-88 till end of January.

KMML was producing rutile in collaboration with the American company, Kerr McGee. This is one of the four plants of this kind put up by the Kerr McGee company in the world — one in Japan, and two in USA. KMML's rated capacity is 21,000 to 22,000 tonnes per annum.

Mr. Venkatachalam denied the report that poor power supply position in Kerala coupled with the withdrawal of priority industry status for KMML was responsible for the under-utilisation of capacity. He said that KMML is exempted from power cut. Since production of rutile is through a highly sophisticated continuous process, there has been a lot of technical difficulties. Naturally KMML had its teething troubles. US technical experts visited KMML in November and again this month, when they identified the problem areas and made some suggestions, which are now being implemented.

Mr. Venkatachalam said it was not a case of under-utilisation of capacity but inability to reach the rated capacity due to technical difficulties and problems, mainly of maintenance.

He said this year a 50 per cent increase in the production of rutile is expected. In 1987-88, the highest production of 907 tonnes in a month was achieved.

Regarding production of titanium dioxide-anatase by the Travancore Titanium Products Ltd., Mr. Venkatachalam said, "We hope production of anatase in TTP will touch 11,000 tonnes this year." Production in the previous year was: 1983-84 — 7658 tonnes, 1984-85 — 8936 tonnes, 1986-87 — 9750 tonnes. In January this year TTP had an attractive monthly production of 1243 tonnes, the highest ever.

There is a plan to double the capacity. The installed capacity (achievable) is 15,000 tonnes. TTP will now produce 11,000 tonnes, which is 74 per cent of the capacity.

There was increased offtake of rutile in January and in February till date. There has been almost double the previous offtake.

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Gulf of Kutch project study nears completion

Field investigations for the proposed 900 mw tidal power station in the Gulf of Kutch have almost been completed and the engineering studies, design and formulation of projects are at the advanced stages of completion. Union Minister of Energy and Communications, Mr. Vasant Sathe, disclosed.

Mr. Sathe was inaugurating a three-day international symposium on "tidal power development" organised by the Central Board of Irrigation and Power in which a large number of experts including some from abroad are participating.

India is endowed with a few attractive potential sites for tidal power development. These are in the Gulf of Kutch and Gulf of Khamabat on the western coast in Gujarat and the Ganga delta in Sunderbans in West Bengal, the overall tidal potential being of the order of 10,000 mw.

India is one of the few countries in the world which has taken a lead in tidal power technology. The Central Electricity Authority has undertaken the techno-economic feasibility study for a 900 mw tidal power project in the Gulf of Kutch which will generate about 1,660 million units annually.

Tidal power development has the unique advantage that tidal energy can be predicted well in advance because of the well-defined nature of the tidal phenomenon. This form of energy generation also has several other advantages. It does not involve any problem and no other environmental extra submergence, no rehabilitation hazards. In addition, several socio-economic benefits accrue to the region.

Mr. Sathe said that along with exploiting conventional sources of energy like hydro carbons and other similar sources, emphasis should also be laid on harnessing renewable and perennial energy sources like solar, wind, biomass and ocean energy.

Presiding over the inaugural session, the Minister of State for Power, Ms Sushila Rohitgi, said that the ocean and the sun held the key to the country's energy future. A considerable improvement had taken place in the tidal power technology in the past two decades or so. It had generated inter-

est in this area in countries having attractive potential sides for tidal power development, she added.

In his keynote address, Mr. Bahadur Chand, Chairman, Central Electricity Authority, said that a tidal power development scheme essentially involve the construction of a relatively long barrage across an estuary to create a large basin on the landward side. The basin fills during flood tide (i.e. rising tide) through a number of sluices. The turbogenerators capable of efficient generation at low heads and consequently handling large flows are installed in the tidal barrage. The energy can be produced during ebb tide (i.e. falling or flood tide (i.e. rising tide) or in both phases viz. flood and ebb tide, if compatible turbines were installed, he added.

The three-day international symposium has been organised with a view to provide a forum to discuss the state-of-the art of tidal power development and to discuss the data collection and analysis and results of engineering studies carried out for the proposed Kutch tidal power project.

The symposium has been sponsored by the Central Electricity Authority. About 125 engineers and scientists engaged in tidal power development, including world-renowned tidal experts from France, UK, Canada, Korea, Netherlands etc. are participating in the symposium.

NAPHTHA-PARAXYLENE PLANT: RELIANCE JUSTIFIES CLAIM AS REFINERY

Reliance Industries Ltd. has made an application before the government for notifying its Patalganga naphtha-paraxylene facility as a "refinery."

The notification, sought by the company, is "not a plea for any concession or favour but a rightful demand perfectly within the provisions of the Central Excise Rules 1944", says a press release issued by the company in Bombay on February 11.

The company says, according to sub-Rule 2 of Rule 140 of the Central Excise Rules, 1944, a premise processing naphtha, whether it be in the public, private or the joint sector, Indian or foreign multinational, is notified as a

"refinery". On such notification, raw naphtha processed for a host of chemicals like orthoxylene, paraxylene, attracts a duty of Rs. 26.50 per kilo litre and not Rs. 2,200 per kilo litre.

Further, a large number of units, Indian and foreign multinationals, private and public, processing naphtha for different end-users, including paraxylene, have already been notified as "refineries" by the government. These companies include Union Carbide (private sector, multinational); NOCIL (private sector); Indian Explosives Ltd. (private sector); Indian Petrochemicals Ltd. (public sector); Bongaigaon Refineries and Petrochemicals (public sector); Rama Petrochemicals (private sector).

All these companies are paying an excise duty of 26.25 per kilo litre and not Rs. 2,200 per kilo litre.

The application of Reliance Industries Ltd. for notifying its naphtha-paraxylene facility at Patalganga is thus in accordance with the letter and spirit of the law and is within the provisions of the Central Excise Rules, 1944.

This is the company's legal and moral claim and, by notifying its unit as a "refinery", the government will be doing the company no favour or showing any concession, but only acting in accordance with the law laid down by parliament, says the press note.

SALT TRADERS CAN SET UP IODISATION PLANTS

Salt traders will be permitted to set up salt iodisation plants to process salt produced by small-scale producers in Maharashtra, Tamil Nadu, Andhra Pradesh and Orissa.

Announcing this at the meeting of the Consultative Committee of members of Parliament attached to the Industry Ministry at New Delhi on Feb. 9, the Industry Minister Mr. J. Vengal Rao, said this step would help the small-scale salt producers to iodise areas, in the interest of public health and prevention of iodine deficiency disorders.

It is the accepted policy of the Government to iodise the entire quantity of edible salt by 1992 in a phased manner.

During 1987-88, about 12-lakh tonnes of iodised salt are expected to be produced and distributed in the country, an official release said in New Delhi.

International symposium on industrial metal finishing

The metal finishing practice occupies an important place in the industrial world for decorative, protective and functional applications. Several new techniques are being developed to meet the challenging demands of industry. CECRI has therefore decided to provide an international forum for industrialists and research workers for discussing the emerging trends in the field of industrial metal finishing by organising this symposium from Feb. 1-5, 1989.

The theme of the symposium

- Pretreatments for metal finishing — electropolishing, etching.
- Phosphating, chromating and surface conversion coatings.
- Anodizing of metals and alloys.
- Electrodeposition/electroplating of metals, alloys, composites.
- Electrodes and electroplating for electronics, printed circuitry etc.
- Organic coatings: Paints, varnishes, enamels.
- Inorganic coatings.

- Physical/Chemical vapour depositions/special coatings.
- Electroforming/electrochemical machining.
- Hot dip coatings — Continuous plating/coating.
- Energy conservation/engineering aspects/equipments/stripping of deposits.
- Effluent treatment/pollution control/recovery and recycling.
- Computerization in metal finishing.
- Process controls/testing and evaluation.

Original research papers and critical reviews on fundamental aspects, techniques, applications, case studies, plant practices and trouble shooting will be accepted for presentation. Plenary, introductory and keynote lectures will be organized. Poster sessions with group discussions would be a special feature.

For more details contact: Prof. K. I. Vasu, Director, Central Electrochemical Research Institute, Karaikudi-623 006, Tamil Nadu, INDIA.

CSIR recast soon

The restructuring of the Council of Scientific and Industrial Research (CSIR) and its laboratories will be completed in the next three months and impact of the changes proposed would begin to be felt after this period.

This was stated by Dr. A. P. Mitra, Director-General of CSIR, while addressing a news conference.

A technology advisory board, headed by an eminent scientist, would soon be constituted to advise CSIR headquarters on various technology development schemes.

Similarly, research councils of laboratories would be reconstituted. The scientists at the bench level would now have far more autonomy in pursuing research and procuring equipment and materials.

Dr. Mitra said that CSIR would now formulate a three-year budget for laboratories (instead of annual budgets) with sufficient flexibility to adjust spending within the allocation. The decentralisation of administrative and financial powers would help laboratories to cut down red tape and expedite projects within time targets. The simplified procedures for purchase of equipment and materials locally and through imports would enable laboratories to take decisions across the table, Dr. Mitra said.

Dr. Mitra said that the administration would no longer be hierarchy oriented. Though laboratories would enjoy considerable autonomy hereafter, CSIR Director-General would continue to monitor projects and expenditure.

Recruitment and promotion procedures of CSIR would be streamlined. The number of administrative staff vis-à-vis scientific staff would be brought down. CSIR now has 20,600 manpower, including 4,239 administrative staff, and a annual budget of Rs. 185 crores. CSIR is now approaching the target of 33 per cent resources from outside

sources such as royalty and consultancy fees.

To facilitate quick purchases, a computerised, data bank would be introduced for items of common use. It would take care of purchase of capital equipment and emergency procurements.

CSIR headquarters would now confine itself to laying down of policy framework for recruitment, promote career development and control common cadre staff, working out training schemes, modernisation of administration, budget allocations and maintain links with Parliament and other ministries, Dr. Mitra said. Only in exceptional cases, the term of a laboratory director would be extended beyond six years.

CANADA KEEN ON IMPORTING ENGG., CHEMICAL PRODUCTS

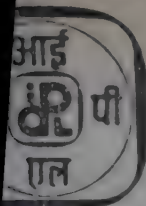
Canada has expressed its interest in the import of a large number of items from India including asphalt, certain specialised chemicals, furnishing materials, jewellery, leather items, carpets and handicrafts during the current year.

The visiting Canadian delegation led by Mr. Monte Kwinter, minister of industry, trade and technology, government of Ontario, Canada which called on the Union minister of state for commerce, Mr. P. R. Dasmunshi in New Delhi recently also expressed Canadian interest in entering into collaboration with India in several fields of manufacture as well as in transfer of technology.

Mr. Dasmunshi while offering full Indian support to the Canadian proposal urged the delegation to explore possibilities of importing non-traditional items from India, engineering and chemical products in particular.

Mr. Kwinter said that an Ontario trade office was being established in India and Canada. Describing this as Canada's expression of commitment to India, he referred to enormous possibilities of collaboration for the manufacture of auto parts involving technology transfer which could then be exported to the US.

He said Ontario was an industrial and commercial hub of Canada with a highly developed economic and industrial infrastructure. Canadian collaboration in India would not only open an export window in Canada but also in the US.



invites

TENDER NOTICE 1/88

Sealed tenders from indigenous manufacturers and/or their sole-distributors or authorised agents for the following:

Tender No.	Item	Approx. Quantity
MMG-4/AI. Foil/88	Aluminium Foil	
	i) Printed	56.5 MT
	ii) Plain	56.5 MT
MMG-1/F-3/88	25 Vials Nested Grey Board Cartons	46 Lac
MMD-2/AC/88	Activated Carbon	61 MT
MMD-2/Anti/88	Antifoam "UCN"	2.36 MT
	(Chemical Nature-Poly Alkylene Glycol Ether)	
MMD-2/AS/88	Ammonium Sulphate (CP Grade)	4.8 MT
MMD-3 TMCS/88	Tri Methyl Chlorsilane	29 MT
MMD-2/HCl/88	Hydrochloric Acid (Pure) 36%	78 MT
MMD-2/HCl(T)/88	Hydrochloric Acid (Tech.)	780 MT
MMD-3 Sul. Acid/88	Sulphuric Acid (C.P.)	121.6 MT
MMG-1/F-4/88	Printed Cartons for various products	46.0 Lac
MMD-3/Proc. Hyd./88	Procaine Hydrochloride	26.8 MT
MMG-1/F-11/88	5 Ply Corrugated Boxes of different sizes	2,59,450 Nos.
MMG-1/F-11(A)/88	3 Ply Corrugated Boxes of different sizes	20,17,200 Nos.
P-788/M/87	Sparkler Filter Pads	20,000 Nos.
P-1091 RJ/88	Horizontal Type Heat Exchanger/Condenser Shell & Tube Type	2 Nos.
P-1217/RJ/88	Air Compressor	3 Nos.
P-1092/RJ/87	Horizontal Type Heat Exchanger/Condenser Shell & Tube Type	1 No.
P-1159 RJ/87	Horizontal Type Heat Exchanger/Condenser Shell & Tube Type	1 No.
MM-1/RC/GW/88-90	Offers invited from manufacturers, or their accredited dealers only for entering into RATE CONTRACT for Laboratory & Scientific Glasswares for two years 1988-90. Approx. value of Purchases Rs. 7 to 8 lacs.	
MMG-5/FC-5/88	Lidocaine	2,000 Kgs.
MMG-5/FC-11/88	Monothioglycerol NF-XVI	1,400 Ltrs.

Tender documents alongwith specifications can be obtained till 15.3.88 on payment of Rs. 100/- each for all items in Cash/Indian Postal Order in favour of M/s. Indian Drugs & Pharmaceuticals Ltd., Virbhadra from Executive Accounts (Cash).

However, the tender documents may also be obtained in person from our Chief Cashier upto one day before the date for opening of respective tenders.

Tenders from distributors or agents should accompany letter of authority from the manufacturer. Tenders for each item must be sent in separate envelope duly sealed and marked Tender Enquiry No. and Date of Opening.

Tenders will be received upto 2.30 P.M. and opened at 3.00 P.M. on the following dates:

For item at Sl. No. 1 to 7 — 4.4.88 For item at Sl. No. 8 to 14 — 6.4.88

For item at Sl. No. 15 to 21 — 8.4.88

SR. MATERIALS MANAGER

Indian Drugs & Pharmaceuticals Ltd

(A Government of India Undertaking)

P.O. Virbhadra-249 202 (Rishikesh), U.P.

Gas units asked to cut production costs

The Minister of State for Industrial Development, Mr. M. Arunachalam, regretted in New Delhi recently that only few of the entrepreneurs, who got themselves registered for manufacture of oxygen gas, had taken concrete steps for implementing their projects.

Inaugurating the 10th national seminar on industrial gases, Mr. Arunachalam said during the past three years, several projects were registered by the Government, totalling a registered capacity of oxygen gas of over 500 million cubic metres. The seminar was organised by the All-India Industrial Gases Manufacturers Association.

The Minister said now that the gas industry was delicensed, it should make all-out efforts to reduce the cost of manufacture as well as to develop non-conventional applications.

The Minister urged industrial gas manufacturers to revolutionise the application of gases in the interest of conservation of material and natural resources. He further called for a strong research and development base for carrying out research on newer uses of industrial gases.

Blanketing medium in chemical manufacture, inert atmosphere in metal treatment, food freezing, oil well stimulation, electronic industry, shrink fittings and scrap recovery etc., are some of very important uses of nitrogen which should find a place in the immediate future, he said. Because the newer applications of nitrogen had not been fully tapped, its production had remained stagnant for the past three-four years.

As nitrogen is a by-product, industry should make efforts to fully recover the same and employ for the non-conventional applications. This would bring down the cost of manufacture of oxygen also, he said adding that in India, 85 per cent of nitrogen is utilised in steel production and heat treatment, two per cent of the production goes for transplantation in other bodies, bone marrow preservation, animal husbandry for preservation of semen and perishable food.

Although industrial gases industry had not yet faced any major safety problems, there is no room for complacency. In fact, it is one of the issues on which there should be no compromise

Mr. Arunachalam also said that strict observance of statutory regulations, exchange of ideas and experience amongst member companies and development of new safety techniques, could go a long way to ensure a high degree of safety.

The two-day seminar was attended by more than 40 foreign delegates among others.

Earlier, Mr. P. Kishore, President

of All-India Industrial Gases Manufacturers' Association urged that no new registration or licences should be granted to the gas industry for the five years and existing units should be encouraged to expand their capacity and upgrade their technologies as well as to diversify in order to make units viable. Furthermore, financial and other incentives should be given to these units for such activities otherwise this vital important industry will get sick.

Superconductors—a fresh breakthrough

Japanese researchers have discovered a new superconductor that works at higher temperatures, may be easier to develop for practical applications and will make it easier to explain how such materials operate, scientists say.

The new material raises the temperature at which superconductivity occurs to about 243 degrees Fahrenheit below zero (minus 152 degrees Celsius), a jump of more than 50 degrees Fahrenheit, above levels attained with previous superconductors, a panel of scientists said recently at an annual meeting of the American Association for the Advancement of Science.

During the past year, reports have appeared of superconductivity occurring at room temperature or even higher, but those observations have not been confirmed and are not widely accepted.

In contrast, the properties of the new material were confirmed within days after its discovery was published on January 22 in a Japanese newspaper, the researchers said.

Superconductors carry electricity without resistance. Thus, the electricity's strength is not dissipated into heat. Until recently, superconductivity had been known to occur only at temperatures near absolute zero, which is about minus 459 degrees Fahrenheit (minus 273 degrees Celsius).

The new superconductor is an entirely new compound that in some respects may exceed the others' performance, the researchers said. "I am personally quite happy we have found a third one," said Mr. K. Alex Mueller of International Business Machines Corporation in Zurich. He won a Nobel prize last year for his discovery of the new higher temperature superconductors.

The new superconductor appears to be flexible, suggesting that it might lend itself more easily than the others to the fabrication of wire, said Angelica Stacey, a chemist at the University of California in Berkeley.

As the superconductor operates at significantly higher temperatures, electrical properties at the temperature of liquid nitrogen may be superior to the properties of the other superconductors, said Mr. John Rowell of Bell Communications Research. Another potential advantage of the new material is that the new superconductor might be less likely to break down chemically over a period of time.

Mr. Philip W. Anderson, a Professor of Physics at Princeton University, said the availability of a third superconductor will make it easier for researchers to develop theories explaining how high-temperature superconductors work.

"What we've discovered is not just a new kind of superconductor, but a new kind of metal," he said.

CSI TO EXPLORE ANDAMANS SEA BED

The Geological Survey of India will undertake geo-chemical, geo-physical and other geological survey-cum exploration of the Andamans sea bed, falling under the country's exclusive economic zone, next month.

The country's premier geological survey organisation has commissioned a research vessel, "Samudra Manthan", for the purpose, according to the GSI officials.

Recently, a GSI team, including the director of the organisation, Dr. N. Sengupta, visited the Andamans and had discussions with the islands administration about ten programmes.

a rapid wrap-up of what's new in operations, processes & products

Catalytic oxidation and fine chemicals

Sheldon (of Oce-Andeno, The Netherlands), has given a very useful account of advantages of carrying out oxidations with environmentally better oxidants such as H_2O_2 , hydroperoxides, particularly TBHP and POCl_3 ; even a tertiary amine oxide is good as the oxidant can be reoxidised. The epoxidation of olefins with both homogeneous and heterogeneous catalysts is covered. Epoxidation with 10% aq. H_2O_2 in a two-phase system using PTC and tungstate --phosphate catalyst is receiving a lot of attention. The oxidation of secondary alcohols to ketones with hydroperoxides with $\text{Vo}(\text{AcAc})_2$ or TBHB (+ $\text{TiO}(\text{AcAc})_2$) for symmetric epoxidation, with hydroperoxides, originally suggested by Sharpless, continues to attract attention. Proteins as chiral ligands have been found to be useful and, for instance, 1:1 complex between osmium (VI) and bovine serum albumin is an enantioselective catalyst for the *Cis* hydroxylation of olefins with TBHB (68% ee). (*Catalyst Today*, 1987, 1, 351).

In an earlier paper Sheldon has given an overview of catalytic oxidation. (*Bull. Soc. Chim. Belg.*, 1985, 94, 651).

Textile finishing chemicals

M.S. Relsch has given a useful account of this area of chemicals which is showing a slow but steady growth in USA. The U.S. textiles market is worth \$50 billion per annum; the entire market for textiles wet processing chemicals is \$675 million per annum and out of this the surface treatment chemicals are worth \$300 million. Some processed textiles have 6 to 12% by wt. of chemicals.

A new generation of soil and stain protectors have entered the market. Fluorochemicals are making inroads. The stain-resistant agent in Nylon carpet fibre appears to be a low mol. wt. sulphonated phenolic resin. Cationic softeners continue to be important. Glyoxal based resins are attracting attention in preference to formaldehyde based resins due to fears of carcinogenicity in the latter. Softeners for fabrics are in demand. Antimicrobial treatment is also useful. (*Chem. Eng. News*, 1987, 22 June, 9-15).

4,4' Dihydroxy-diphenyl sulfone (DHDPS)

Amoco have claimed that DHDPS can be prepared in high yields by sulfonation of PhOH in a solvent from which it crystallises and retains the by-product $4\text{HO}-\text{C}_6\text{H}_4\text{SO}_2\text{C}_6\text{H}_4\text{OH}-2$ in solution. The mother liquor is recycled when the *ortho* isomer rearranges to give the desired para isomer. *o*-Dichlorobenzene seems to be a good solvent. (E.P. 220,004, 1987, *Chem. Abstr.* 1987, 107, 154071).

Paradichlorobenzene (PDCB)

Toyo Soda have claimed that chlorination of chlorobenzene in the presence of L-type zeolite gives predominantly PDCB. (EP 231,133, 1987, *Chem. Abstr.*, 1987, 107, 136342).

Isodecyl phosphate dichloride

It has been claimed that isodecanol can be reacted with POCl_3 , with toluene as a solvent, to give the title compound in 99% yield; without toluene as a solvent colouration is observed. (*Chem. Abstr.*, 1987, 107, 154524).

Ibuprofen

A Japanese Co. has claimed that $4\text{-Me}_2\text{CHCH}_2\text{-C}_6\text{H}_4\text{COMe}$ can be reacted with $\text{PhS}^+\text{Me}_2\text{MeSO}_4^-$ (obtained from Me_2SO_4 and PhSMe) to give the oxirane $4\text{-Me}_2\text{CHCH}_2\text{C}_6\text{H}_4\text{-(CH}_2\text{)}_2\text{(O)}$ (Epoxide). The oxirane, on isomerization with anhydrous MgCl_2 gives $4\text{-Me}_2\text{CHCH}_2\text{C}_6\text{H}_4\text{CHMeCHO}$ (I) which in turn on oxidation gives ibuprofen. (E.P. 220792, 1987, *Chem. Abstr.*, 1987, 107, 96436).

Nippon Petrochem Co. has claimed that the aldehyde named above (I), with aq. NaOCl or NaOBr , gives ibuprofen. (*Chem. Abstr.*, 1986, 105, 97163).

Bis (hydroxyphenyl)sulfone (BHPS)

Amoco Corporation have claimed that 4,4' isomer can be separated from the 2,4' isomer by selective precipitation from aqueous alkaline solution with AcOH . (E.P. 220855, 1987, *Chem. Abstr.*, 1987, 107, 116109).

Trimethyl orthoformate (TMOF) from chloroform and CH_3ONa

Huels have claimed that CHCl_3 reacts with CH_3ONa in CH_3OH at 60-90°C, at 2-3 atm., to give 96% H C(OMe)_3 . (*Ger. Offen.* DE 3,606,472, Sep. 87, *Chem. Abstr.*, 1987, 107, 153942).

Platinum metal complexes in asymmetric catalysis (AC)

J.M. Brown has given a very useful account of AC which is now commercially exploited for the synthesis of optically pure drugs (e.g. L-dopa), agrochemicals, chiral smectic C liquid crystals and polymers of controlled helicity. High enantiomer excess in catalytic allylic alkylation has been realised. Kinetic resolution of racemic itaconates is possible. Catalytic olefin isomerization as a route to optically active citronellol precursors is feasible. Precursors for Vitamin E have been obtained. This topic of AC seems to have a vigorous present and a secure future. (*Platinum Metals Rev.*, 1987, 31, (No. 3), 137-144).

Phase Transfer Catalysis (PTC): New Chemistry, Catalysts and Applications

C.M. Starks, who pioneered PTC, has edited this series for the A.C.S. (A.C.S. Symposium Series 326, Washington, D.C., USA, 1987) and some of the stalwarts have contributed. It appears that a range of chemicals are made with PTC and their quantum may be in the range of 25 to 50 million Kg per annum using about 0.4 million Kg per annum of PT catalyst. A number of speciality polymers (e.g. polycarbonates) are made through PTC. PTC in gas-liquid-liquid systems, involving hydrogenations, oxidations, carbonylations etc. is possible. In solid-liquid systems, a small amount of water can make a lot of difference in rates. Oxidations with NaOCl , KMnO_4 , etc. are possible with PTC.

New catalysts based on N-alkyl-4-(N'-N'-dialkylamine) pyridinium salts are stable at much higher temperatures approaching 200°C and are 100 times more active than PEG.

Dolling et.al. of Merck, U.S.A. have given chiral synthesis using N-(p-trifluoromethyl benzyl) cinchonium bromide as chiral PTC. Diuretic drug Indacrinone has been made through chiral PTC.

Multisite PTC catalysts have also been developed.

Hydroformylation (oxo-reaction)

Exxon have claimed that internal olefins can be subjected to the oxo reaction with CO and H_2 with homogeneous Rh triorganophosphine catalyst with a sterically hindered tri-cycloalkylphosphine. Rapid reaction rates are realised along with high selectivity and catalyst stability. (*E.P. Appln.*, 195,656, *Plat. Met. Rev.*, 1987, 31, 159).

Immobilized colloidal Rh catalyst

Hirai et.al. have shown that colloidal Rh particles can be firmly immobilized onto a polycrylamide gel having amino groups at pH 4-9. This catalyst has high activity for hydrogenation and can be used repeatedly without measurable decrease in activity. (*Chem. Lett., Jpn.*, 1987, No. 1, 149).

Pure Isobutylene from C_4 mix.

Separation of isobutylene from the C_4 butane/butenes via MTBE and subsequent cracking is now well established. M. Miranda has now shown that alkylation of phenol and dealkylation of t-butylated phenol can also be considered and has proposed flowsheets. (*Hydrocarbon Processing*, 1987, 66, No. 8, 51-52).

Affinity liquid-liquid extraction of lactate dehydrogenase on a large scale

T. Jerneld et.al. have shown that the enzyme lactate dehydrogenase can be rapidly extracted in an aqueous two-phase system (aqueous bipolymer two-phase) with a centrifugal separator; the use of the dye procion yellow HE-3G, bound to PEG, enhanced the rate of extraction. (*Biotech. Bioeng.*, 1987, 30, 809).

High Fructose Corn Syrup (HFCS) containing 55% Fructose

HFCS containing 55% Fructose is required for aerated drinks like coca-cola. The usual process with glucose isomerase gives 42% Fructose, 51% Glucose and 7% Oligosaccharides. Now Visuri and Klibanov have found that in aq. ethanol medium glucose isomerase gives 55% fructose based on the above feedstock containing 42% fructose and thus ion-exchange chromatography is avoided. This is a promising process. (*Biotech. Bioeng.*, 1987, 30, 917).

Asymmetric hydrogenation : Effect of solvents

Marotti et.al. have developed rhodium amino-phosphine -- phosphinite complexes as a catalyst for complete conversion with highest ee. A new complex has been synthesized which shows remarkably different stereo differentiating ability in different solvents. (*Gazzeta Chim Italiana*, 1987, 7, 129).

Benzanaphthol acid (BNA) from naphthalene (N) and CO

Carbonylation of N with CO, using Pd/Phenanthrene catalyst gives BNA with 70% selectivity. (*Chem. Lett.*, 1987, 1159).

A novel method of separating cyclohexanol and cyclohexanone

I. Goldberg et.al. have shown that an efficient separation of the mixture under reference is possible via. complexation with 1,1-di (p-hydroxy phenyl) cyclohexane and 1,1,6,6 tetra phenyl hexa-2,4 diyne-1,6-diol. (*Chem. Lett.*, 1987, 1617).

Selective reduction of aromatic aldehydes in the presence of aromatic ketones with NaBH₄ and SnCl₂ in THF

Ono and Hayakawa have shown that, for instance, benzaldehyde can be selectively reduced in the presence of acetophenone with NaBH₄ in the presence of SnCl₂ in THF medium. (*Chem. Lett.*, 1987, 853).

Asymmetric synthesis: Chiral ligands from amino acids

Mortreux et.al. have prepared new aminophosphinephosphinate ligands from amino acids or amino alcohols precursors. These ligands are good auxiliary agents for asymmetric inductions (hydrogenations, hydroformylation of olefins, C-C coupling, etc.). Hydrogenation of ketoacids with ee of 80% with substrate to Rh ratio of 5000 has been realised. (*Bull. Soc. Chim. Fr.*, 1987, No. 4, 631).

Selective oxidation of primary alcohols to aldehydes and secondary alcohols to ketones

Bilgrien et.al. have shown that trinuclear Ru carboxylate catalyst allows the conversions under

reference under mild conditions. Tertiary alcohols are unreactive. (*J. Am. Chem. Soc.*, 1987, 109, 3786).

Catalytic dehydrogenation of C₃-C₆ alkanes

B.P. have claimed that catalysts based on Pt/Ru/Ir/Rh/Pd on a silicalite support show high activity and selectivity for dehydrogenation reaction. (*Eur. Pat. Appln.* 212850A, 1987), (*Cf. Plat. Met. Rev.*, 1987, 31, 216).

Removal of SO₂

IFP have claimed that alumina, containing Group VIII noble metals, preferably Pt and/or Pd, and MgO allows SO₂ to be removed from gases. MgO goes to MgSO₄ and subsequent contact with H₂S converts MgSO₄ back to MgO. (*Eur. Patent Appl.* 215, 709A, 1987) (*Cf. Plat. Met. Rev.*, 1987, 31, 218).

Dimerization of alkyl acrylates/methacrylates

Shell Oil Co. has claimed that by using a catalyst based on chlorobis (ethylene) Rh(I) dimer and Ag tetrafluoroborate, alkyl acrylates/methacrylates can be dimerised to produce unbranched dimers with high selectivity. (U.S. Patent 5,638,084, *Cf. Plat. Met. Rev.*, 1987, 31, 218).

Ibuprofen + Paracetamol combination

It has been claimed that the acyl chloride of Ibuprofen can be reacted with, for instance, paracetamol to give the corresponding ester 4-Me₂ CH CH₂C₆H₄CH Me COOC₆H₄NHAc. This ester has 2-pharmacol active parts. (*Chem. Abstr.*, 1987, 107, 236247).

Formamide to monomethyl and dimethyl formamides

Du Pont have claimed that HCONH₂ reacts with MeOH, in presence of R¹R²R³R⁴N⁺X⁻ (R¹-R⁴ = C₁₋₁₂ alkyl, HOCH₂CH₂, Pyridyl, PhCH₂, X = halo, OH), at 185-275°C, to give the mono- and di-methyl formamides. (*EP Appl.* 233,393, Aug., 1987, *Cf. Chem. Abstr.*, 1987, 107, 236092).

Recovery of S from H₂S with aqueous iron salt solutions

Absorption of H₂S in aqueous solutions containing ferric and ferrous chloride gives S which can be

separated in the molten phase by heating the aq. phase. Ferrous chloride can be electrochemically converted to ferric chloride giving H_2 as a by-product (J.P. [Idemitsu Kosan Co.] 62,216,905, Sept. 1987, *Cf. Chem. Abstr.*, 1987, 107, 239271).

Extraction with supercritical (SC) CO_2 of alcohols from sugarcane wax

Filter cakes from the purification of sugarcane juice have been subjected to extraction with SC CO_2 to give mixtures of octa COS and trioctanol. (*Chem. Abstr.*, 1987, 107, 236087).

Role of fine bubbles in three phase reactions

Bhagwat, Joshi and Sharma have brought out, in an elegant way, the importance of micron-size bubbles in a variety of situations of practical importance where the solids may be a soluble/insoluble reactants, inert materials and catalyst particles. Different controlling regimes have been considered and it is striking that in some cases even less than 10% of the gas hold-up comprising of micron size bubbles can lead to an enhancement by a factor of 10.

Effect of pressure on photoreduction in presence of micelles

Tamura and Higaki have shown that an increase in pressure favourably influences the rate of micelles catalysed (SDS and CTAB micelles) photoreduction of p-benzoquinone. (*Chem. Express*, 1987, 2, 189, *Cf. Chem. Abstr.*, 1987, 107, 197293).

3-Chloro-4-Isopropylaniline (m-chloro-p-cumidine) (CIPA)

CIPA is an intermediate for agrochemicals and can be obtained by the chlorination of p-cumidine in 96% H_2SO_4 at 25-28°C in the dark. The yield of CIPA has been claimed to be 84/5%. (*Jpn. Pat. Chem. Abstr.*, 1987, 107, 236226).

Separation of 2-benzoyl benzoic acid (BBA) from 2(sec + tert) amyl benzoyl benzoic acid (ABA)

The Friedel-Crafts catalysed products of condensation of phthalic anhydride and tert amyl benzene, CBBA + ABA, can be separated by taking the product in 2% H_2SO_4 and extraction with aq. NaOH. The extract on treatment with 20% H_2SO_4 and at pH of 6 to 6.2 ABA precipitates and with the subsequent acidification to pH 5.7 the other products ppt. (Ger. Offen. 3,609,827, Sep. 87, *Cf. Chem. Abstr.*, 1987, 107, 236241).

New urease Inhibitor

TVA have shown that thiophosphoryl trianide (TPTA) is effective in slowing the degradation of urea in soils. Till recently phenyl phosphorodiamidate (PPDA) was considered as the most effective substance for the above inhibitor. TPTA is compatible with urea and stable in storage and should be cheaper than TPTA. (*Chem. Eng. News.*, 1987, 14 Sept., p. 25).

A new route for piperidine (P)

P is generally made by the hydrogenation of pyridine (both catalytic and electrochemical routes are used). Now Todashi Ayusawa of Mitsubishi has shown that catalytic hydrogenolysis of tetrahydrofurfurylamine with Co catalyst gives P. (*Chem. Eng. News.*, 1987, 14, Sept. 22).

Manufacture of tert amines

BASF have claimed that Pentasil-type borosilicate (94.2% SiO_2 and 2.3 B_2O_3) zeolites, impregnated with Cr, allow direct amination of tert olefins. Thus isobutylene reacts with ammonia at 300°C and 300 atm. to give tert $BuNH_2$ at 15.4% conversion of isobutylene with higher than 98% selectivity. (Ger. DE 3,634,247, July 1987; *Cf. Chem. Abstr.*, 1987, 107, 200919).

Removal of Cd from crude phosphates

The Cd content of phosphate rocks (PR) can vary from 90 ppm (Morrocan) to 1 ppm Jordaman). A number of processes can be employed for the reduction of Cd content. Calcination at 800-1000°C gives 10 to 50% Cd of the original amount. Acidic calcium nitrate can be used for the leaching of PR to remove Cd; Dialkyl dithiophosphoric acid esters are good extractants. From crude acids extraction can be done with long-chain amines (Von Plessen, H and Schimmel, G., *Chem. Ing.-Tech.*, 1987, 59, No. 10, 772).

Electro-reductive stripping of cerium in the TBP-NHO₃ two-phase system

Hoh et.al. have shown the efficacy of electrolysis in two-phase system (30% TBP-70% dichloromethane -- aq. solution) for the stripping of cerium (IV) from loaded organic solvent. Mass transfer factors affect this electrochemical process. (*Hydrometallurgy*, 1987, 19, 209).

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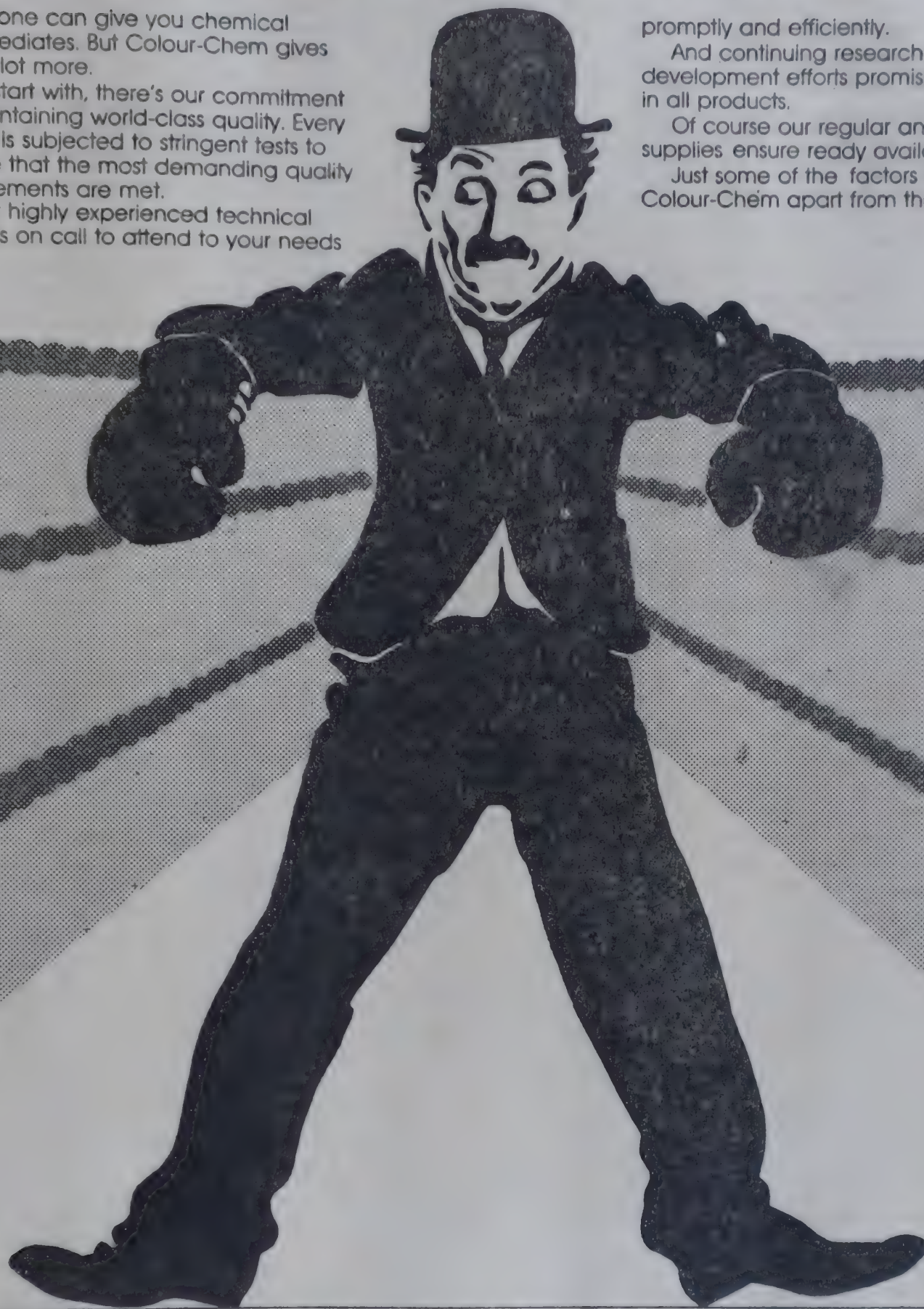
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Plastic film in canals lining recommended

A census-cum-evaluation study of plastic lining in canal systems has found that highly encouraging results are obtainable from the use of plastic film in the lining of canals.

The study, which covers the States of Gujarat, Madhya Pradesh and West Bengal, reveals that low density polyethylene (LDPE) film with soil cover can be used both in bed and slope side. Plastic film combination linings have improved in saving of water by preventing seepage loss to the extent of 10-15 per cent compared to conventional concrete or brick linings.

The plastic film lining with soil cover will be about 60 per cent to 75 per cent of the cost of conventional rigid cover lining. Plastic film has been used successfully also in the bed as well as sides in the major irrigation projects with rigid cover. The quality of the film over a period of time has not deteriorated.

The study has also recommended that the soil obtained from canal or locally available material should be used as cover material.

Regarding the durability of the film, the report has indicated that visual inspections have indicated that there is no evidence of deterioration in the film over a period of about nine years. This has been corroborated by tests conducted by the Gujarat Engineering Research Institute, Vadodara, on film samples obtained from canal linings in Gujarat and Haryana.

In exceptionally weed-infested areas, in case of LDPE film lining with soil cover, the cover materials should be given anti-weed treatment which should be repeated at an interval of two or three years, according to the study.

Canal systems today contribute about 40 per cent of the country's net irrigated areas. It is estimated that upto 70 per cent of the canal water is lost and unutilised due to seepage and evaporation in the canals and the water conveyance system from the canals to the fields. With the increase in irrigated area and limited water resources, the need for conservation of water and improved water management techniques is now gaining added importance.

The use of LDPE in canal lining was introduced in India in 1957-59 on an experimental basis. During the last 30 years, its use continued to develop and

it is presently being used as one of the approved types of lining in Gujarat, Madhya Pradesh, West Bengal, Rajasthan, Punjab, Haryana and some other States.

PLEA TO CUT EXCISE ON PVC RESIN

PVC Resin Manufacturers Association of India, while agreeing with Plastic Manufacturers' Association and PVC processors on the need to lower cost of PVC resins, feels that reduction in import duty alone will not solve the problem.

In a press release it has stated that out of the total demand for PVC of approximately two lakh tonnes, 1.20 lakh tonnes is manufactured indigenously and the balance 80,000 tonnes is being imported.

If the import duty is reduced, users of imported PVC resins would benefit. However, this is most unlikely as reduction in import duty is always followed by increase in the c.i.f. price of PVC resins.

Instead of reducing import duty, the Government should slash excise on PVC resins which would benefit both users of imported and indigenous PVC resins.

The press note adds that excise on other thermoplastics is 30 per cent and it is high time that PVC was also brought on par with them. Lowering of PVC resin prices will not lead to loss of revenue to the Government since cheaper PVC resin bound to increase its consumption.

10 P.C. FALL IN HDPE PRICES

The assurance of Mr. H. K. Khan, Secretary, Department of Chemicals and Petrochemicals, to impose a flexible import of duty on raw materials for plastic units so that increases in raw material prices will automatically be followed by lower duties seems to have a telling effect particularly as far as HDPE prices are concerned.

According to market circles in Bombay prices of certain grades of imported HDPE have been fallen by at least 10 per cent. Now imported HDPE has been quoted around Rs. 33 per kg as against Rs. 36 per kg. a fortnight ago.

What has perhaps promoted the downtrend, market sources point out, is the announcement by Mr. Khan of a

raw material bank to ensure regular supply of plastic resins to processors who will get indigenous and imported materials at an approximate ratio of 40:60 per cent as a "pooled price" between the indigenous and international prices.

At a workshop on "Scarcity and Rising Prices of Plastic Resins" organised by National Alliance of Young Entrepreneurs (NAYE) in the city on February 2, Mr. Khan had also revealed that State Trading Corporation (STC) and Indian Petro-Chemicals Corporation Ltd. (IPCL) were currently shopping in the world markets for procuring materials for the proposed "bank".

Mr. Khan had also assured that his ministry had decided to set up a cell to monitor prices and availability of all raw materials once every fortnight.

S. K. BIRLA GROUP PLANS BOPP UNIT AT HALDIA

The S. K. Birla group is to join hands with the West Bengal Industrial Development Corporation (WBIDC) to set up a project at Haldia to produce BOPP (plastic packaging material). The total cost of the project is estimated at Rs. 30 crores.

Chloride India Limited had also tried for the same projects some time ago. However, on learning that discussions with the S. K. Birla group had made headway, it backed out. After all, the same S. K. Birla group has also interests in Chloride.

The Birla Eastern Investment Limited which is to hold equity in the Singapore-based Chloride Eastern Limited is likely to be the promoter of the new company and Chloride India too might be involved in it.

Mr. Siddharth Birla while talking to *The Economic Times*, observed that the question of acquisition of foreign know-how for the project had not yet been finalised. He gave two reasons. First, the right type of technology was not always easy to come by. The equipment supplies promising technology would often draw a blank at a later stage. Next, in this particular case, the government was yet to clear the tie-up proposal made by the promoters. He indicated that the tie up might be with a British company.

Mr. Birla conceded that there were several parties after the project. "As the situation stands now, we are ahead of others in the race", he said.

Record urea output by Kribhco's hazira plant

The giant gas-based fertiliser plant Hazira, set up just a couple of years ago by Krishak Bharati Cooperative (Kribhco), already has two outstanding achievements to its credit.

In the very first year of its operations (co-operative year 1986-87), the plant was able to achieve 97 per cent capacity utilisation in the production of urea, which is claimed to be a first-year world production record for plant of its class.

Before that, the plant itself could be completed at a saving of Rs. 72.71 crores in relation to its original estimated cost of Rs. 957.71 crores. The revised cost estimate stood at Rs. 875 crores, a saving of 7.6 per cent.

Recently, a new Rs. 2.4-crore purge gas recovery unit designed by Bharat Heavy Plates and Vessels was commissioned at Hazira to augment ammonia production by 110 tonnes per day.

In addition the plant is producing heavy water and there is a proposal for a Rs. 9-crore plant for the recovery of 250 tonnes of carbon di-oxide from the waste gases every year, which can be used in the production of urea. At present, carbon di-oxide costs about Rs. 2 per kg. but its cost from the proposed project would be only 25 paise per kg.

Kribhco has also built a jetty on the river Tapi, 11 km from the sea to facilitate fertiliser movement of ships. The Gujarat maritime board, on its part, has undertaken to commence dredging of the river Tapi at a cost of Rs. 1 lakh per day to facilitate ship movement. About 60 days of dredging would be required before sea-borne marketing operations can begin.

A group of visiting newsmen, which was taken around the Hazira plant (17 km from Surat in Gujarat) by the Director of Operations, Mr. H. S. Kohli, were told that annually, three million cubic metres of gas from Bombay High were being consumed in the production of fertiliser and 30 mw of power.

There are two ammonia plants of 1,350 tonnes per day capacity and two phases of urea plants of 2,200 tonnes per day capacity. The annual capacity for urea production is 14.52 lakh tonnes. The Hazira complex has a handling capacity of 6,000 tonnes per day, urea silos of 90,000 tonnes and am-

monia storage capacity of 20,000 tonnes.

The capacity utilisation of the complex amounted to 97.44 per cent in co-operative year 1986-87 (July to June) against a target of 80 per cent and 110 per cent capacity utilisation in the first seven months of 1987-88 (July to January) against a target of 82 per cent.

About 2,000 to 2,500 tonnes of surplus ammonia every month is being sold to the IFFCO plant and another 25-30 tonnes of surplus ammonia to other industrial users.

Mr. Kohli said that surplus ammonia is likely to go up as production is crossing the 2,700-tonne per day capacity mark on several days in the week. Hence, the proposal for the carbon dioxide extraction plant from waste gases, which would utilise the surplus ammonia to produce urea.

The on-stream production at Hazira of 345 days out of 365 days in the year is the highest in the country and compared favourably with the West.

In spite of the drought, Kribhco was able to despatch 14.01 lakh tonnes of fertiliser from its Hazira plant and sell 12 lakh tonnes of it.

The second annual management conference of Kribhco was inaugurated at Hazira by the Fertiliser Minister, Mr. R. Prabhu recently. He said that no further imports of urea would be made in 1988-89. He said that while physical performance has been good, fiscal performance is turning out to be poor on account of providing discounts which, last year in the case of Kribhco, came to Rs. 30 crores. He wanted indirect discounts to end by the end of this month.

Later talking to newsmen, the Minister said that the Shahjahanpur gas-based fertiliser project might be given to someone else if the present party continued to show disinterest. In case, it has to be given to a co-operative, then IFFCO would be preferred since it has a similar plant nearby at Anola.

Earlier in the inaugural function of the conference, the Kribhco Managing Director, Mr. K. K. S. Chauhan, said that Kribhco could undertake a Rs. 1,000-crore project without budgetary support because of cash reserves augmentation. He said that cash resour-

ces of Rs. 400 crores to Rs. 500 crores would be generated over a period of three to four years.

Mr. Paul Pothen, former chairman of IFFCO, called for fertiliser co-operatives like Kribhco to look beyond the fertiliser field for investments.

CENTRE CLEARS HAZIRA HEAVY WATER PLANT

The central government has accorded sanction for the construction of a new 110 metric tonne heavy water plant at Hazira in Gujarat. Procurement of equipment for the plant has already begun and the project is expected to be completed by 1990.

According to a recent bulletin issued by the department of atomic energy the new heavy water plant will be similar in design to the one in Thal Vaisht in Maharashtra of the same capacity synthetic gas to be used as fuel at the plant will be drawn from a nearby fertiliser plant.

The heavy water plant at Hazira is part of the four new plants envisaged as under a 15 year plan to increase nuclear power capacity to 10,000 mw by the year 2000. The plants will have an aggregate production capacity of 970 tonnes per year to meet the total requirement of about 13,000 tonnes per year for the programme.

With the sanctioning of the new plant the total number of heavy water plants in the country has gone up to eight representing a total capacity of 648 metric tonnes per year. Of these, five are in operation while three including the one at Hazira are under construction.

FACT NOTCHES UP NEW SALES RECORD

The public sector Fertilisers and Chemicals Travancore Ltd. (FACT), has set new sales record during the first 10 months of the current year ending January 1988, according to a FACT release.

The sales turnover in terms of value at Rs. 208 crores (excluding subsidy) achieved during the period from April 1987 to January 1988 is an all-time record, while the sales turnover for the corresponding period last year was only Rs. 181 crores, registering an increase of 15 per cent.

Petrochem imports may touch Rs. 1000 cr.

India has had to resort to import of petrochemicals, estimated at nearly Rs. 600 crores, this year to meet the rapidly growing demand of consumer industries and the agricultural sector, writes Sushma Ramachandran in the Economic Times.

The sharp rise over last year's imports of Rs. 450 crores has shocked bureaucratic and political circles. What is worse is that there are indications that imports may touch Rs. 1000 crores by next year.

Among the numerous reasons for this avoidable drain of foreign exchange resources is that the demand for petrochemicals has far exceeded planned production. And the situation is going to deteriorate with uncertainty looming large over the creation of fresh capacities in petrochemicals.

The letter of intent, for instance, issued to PICUP for the Saleempur Aro-

matics Project expired some months ago and the project is now back to the preliminary stage as a new promoter has to be identified.

In respect of Haldia Petrochemicals, senior officials claim that all clearances have been given and yet the project has not got off the ground. It continues to be held up on one pretext or another, evidently owing to political bickerings between the centre and the West Bengal government.

Even in regard to the Gujarat gas cracker project, for which negotiations have been going on with Reliance Industries, a final decision has yet to be taken.

These delays will prove disastrous for the country in the next few years because the demand for petrochemicals has grown beyond earlier expectations and the trend is not likely to be reversed. In case these projects do

not come up according to schedule, petrochemical imports may reach unmanageable levels.

Even more disturbing is the fact that prices of petrochemicals in the international market have been spiralling upwards and there appears to be no respite from this trend.

Enquiries in New Delhi reveal that during 1987-88, the total imports of basic petrochemicals like polyethylene and polypropylene will be 3.50 lakh tonnes, costing an estimated Rs. 585 crores. This is 50,000 tonnes higher than in 1986-87.

The prices of these petrochemicals began to rise in the international market towards the end of 1986 and the increase has continued throughout 1987. In some cases, such as polypropylene, the required quantities are not available even at increased prices. In fact, indigenous prices are much lower than those of imported products.

Official sources say the first major petrochemicals complex to come on stream in the near future will be the Maharashtra Gas Cracker Complex (MGCC) which is being implemented by the Indian Petrochemicals Limited (IPCL).

Although the MGCC is expected to be completed on schedule, down-stream units may face difficulties because of the delay by the Oil and Natural Gas Commission in finalising the contracts for the C-2, C-3 complexes at Uran.

The industry ministry had informed the ONGC that the supply of gas should commence by April this year so as to provide ethylene to down-stream units for pilot production. The ONGC, however, has stated that it will be able to supply gas by the end of 1989 only. This schedule will coincide with the beginning of regular production in the MGCC, but the down-stream units will have to be supplied ethylene for their initial requirements from the IPCL for about nine months.

While these schemes are being held up owing to various factors, not the least of which is political interference, there continues to be a shortage of petrochemicals in the country, despite large imports.

Market enquiries reveal that numerous processing units are either working below capacity or have been forced to close down owing to non-availability of basic petrochemicals. The belated reduction in the import duty by the

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ment about six months ago has more than neutralised by subsequent increases in the prices of petrochemicals.

The shortage of polypropylene was expected to be made good by the commissioning of IPCL's new copolymers unit, but this has also been held up about three months. Originally it was to have been commissioned in October last year. It has commenced production last month, and the actual availability of copolymers will begin only in March.

This has, it is learnt, affected the indigenous programme of Maruti Udyog. Polypropylene was to have been

supplied by the IPCL's new plant for the manufacture of steering wheels which were earlier being imported for Maruti vehicles.

According to experts in the field of petrochemicals, if the government is caught unawares by the sharp rise in consumption this year, it has only itself to blame. The much-publicised apex committee on petrochemicals submitted its report over a year ago and the recommendations are reported to have been accepted. This does not, however, seem to have led to any hastening of plans to install indigenous production capacity by decision-makers.

It may be recalled that AIPDC has applied for a letter of intent for setting up a naphtha cracker unit using eight lakh tonnes of naphtha to produce 2,50,000 tonnes of ethylene, 1,30,000 tonnes of propylene, 81,000 tonnes of mixed C-4, 1,26,000 tonnes of pyrolysis gasoline and 26,000 tonnes of pyrolysis fuel oil. Various alternative patterns of downstream units are stated to have been presented to the inter-ministerial group. Among these are the manufacture of HDPE, LDPE etc.

It is understood that the Vizag project is likely to require the least complementary investment for an early commissioning of a project of this nature since a suitable site has already been identified, with plenty of power and water availability. Naphtha surplus for the project already exists, both from the Vizag refinery and other sources.

Questioned on shortage of power in the State at the moment, Mr. V. K. Srinivasan, explained that the "power problem in AP is situational and not structural".

VIZAG PETROCHEM UNIT

Andhra Pradesh stakes claim

A number of factors in terms of demand projections, locational logic, plant size and economies of scale of operations favouring setting up of the Vizag petrochemicals complex in the early nineties are understood to have been highlighted by AP officials recently at Delhi to the inter-ministerial group.

The team of officials putting forth the Vizag unit case was stated to include Dr. N. Bhanuprasad, Chairman of AIPDC, Mr. V. K. Srinivasan, ex-officio Secretary to the Government and officer on special duty with AIPDC and Mr. B. N. Yugandhar, State Industries Secretary.

The presentation by the team stated that the country produced only 2.56 lakh tonnes of ethylene and when the Nagothane unit goes on stream, another three lakh tonnes would be added. However, the world outlook for ethylene has looked up tremendously as the capacity utilisation by plants across the world increased from 67 per cent in 1981 to 84 per cent, in 1985 and to 91 per cent in 1986.

Total ethylene capacity available in the world at present is put at around 48 million tonnes of which North America accounted for 19 million tonnes, followed by 14.91 million tonnes by western Europe, Asia-Pacific (including India) 7.79 million tonnes and West Asia 2.91 million tonnes. This showed how much the country lagged behind in ethylene production, it is stated. While the need for capacity creation requiring concrete advanced

action is being stressed, being a capital-intensive industry, a very close examination of minimum economic size etc., played a crucial role. The apex committee of the Union Government favoured ethylene plants of 2,50,000 to three lakh tonnes size.

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GAIL chief for natural gas route to petrochemicals

India should reconsider its petrochemical policy and opt for natural gas route to petrochemicals, thereby conserving petroleum for the mounting fuel requirements of the country, according to Mr. Vineet Nayyar, Chairman and Managing Director of Gas Authority of India Ltd. (GAIL).

The Bombay High production has peaked and there has been no major discovery which will significantly add to oil production. The Oil and Natural Gas Commission has projected 50 million tonnes by the end of the century, which still leaves a massive deficit, he said.

Addressing a national conference on "Oil as the growth engine for chemicals and petrochemicals" organised by the All-India Manufacturers Organisation in Bombay recently, he said the country cannot afford to bridge the gap with imports without distorting other sectors of its economy. A policy decision can lead to gas accounting for 40 per cent of the hydrocarbon consumption by the turn of the century.

According to him, there is a strong case for using gas in preference to naphtha as a petrochemical feedstock. Ethylene production from gas consumes about 50 per cent less energy, it also means higher output of ethylene — 80 per cent compared to 63 per cent in case of naphtha route. It also requires lower investment.

Methane could be tapped for ammonia-based fertilisers, and ethane could be used for the manufacture of ethylene and downstream plastics like HDPE and LDPE. Propane, through hydrogenation, could be put to use for the production of propylene, polypropylene and the like, he said.

Traditional wisdom is against the use of gas for power production. For rapid increase of power base, gas was superior to coal. Recurring costs however are higher for gas-based power plants as gas is more expensive than coal. Gas can also be viable as a domestic fuel in densely populated cities like Bombay and Ahmedabad, Mr. Nayyar said.

Energy consumption per unit GDP in India was twice that of Europe because of obsolete technologies and waste, Mr. Nayyar said. Indian paper

and pulp industry, for example, consumed four times as energy as its counterparts in OECD countries. Despite try consumes between 20 and 100 per modernisation, India's fertiliser industry consumes more energy than OECD fertiliser units.

By 1995, gas production is estimated to touch 31 million cubic metres which is expected to increase to 40 million cubic metres by the turn of the century.

Mr. S. L. Khosla, Chairman of the Indian Oil Corporation said the projected demand-supply balance of petroleum products based on existing and planned refineries clearly indicates that feedstock from refinery streams would not be available for new petrochemical plants, and primary petrochemical projects beyond the committed level may therefore have to be based on imported feedstocks, he warned.

Since petrochemical feedstock from our refineries may in some cases be more suitable than imported ones, imports would merely supplant the products at refineries. In cases where the imported feedstocks go directly to the petrochemical units supply and transportation logistics need to be carefully studied. Even more complex, Mr. Khosla said, would be the absorption of return streams from petrochemical units after extraction of the relevant components.

Refinery streams are utilised to produce naphtha, kerosene and olefins from fluid catalytic cracking (FCC) units for petrochemicals. The deficit in products like naphtha, motor spirit and the like in the Eighth Plan period is expected to be 1.6 million tonnes. In the case of kerosene, which along with HSD forms the bulk of middle distillates, the deficit of 6.4 million tonnes at the end of the Seventh Plan will increase to 39.8 million tonnes by 2004-05.

On the other hand, he said, if butylene/propylene is recovered from the LPG cooking gas from FCC, it will reduce the LPG supply. This will further aggravate the shortage of LPG which is likely to go up to 2.25 lakh tonnes by 1989-90.

The above scenario, Mr. Khosla said, is despite the fact that the coun-

try's present refining capacity of about 48 million tonnes per annum is to be increased to 51.6 million tonnes by 1989-90 through debottlenecking of four refineries. By 1994-95, when Karnal and Mangalore refineries would be added, the capacity would go upto 61.2 million tonnes per annum. At that time the country's consumption of petroleum products would exceed 73 million tonnes.

Mr. Khosla further observed that to meet the product deficit of 17.7 million tonnes by the end of the Eighth Plan, the country has two options. The first one, of importing the entire quantity, would be virtually impossible. The other option is to only import about 5.4 million tonnes of deficit middle distillates and produce the rest within the country by adding 12 million tonnes per annum of new refining capacity and importing crude oil.

By 1994-95, indigenous crude availability is estimated at 42.3 million tonnes, nearly 61 per cent of which will come from offshore fields. The crude oil import will go up to 45 million tonnes by the end of the Ninth Plan (1999-2000) and 50 million tonnes by the Tenth Plan (2000-05), he added.

GUJARAT SEEKS HIKE IN OIL ROYALTY

The Gujarat government has finalised a memorandum to be submitted to the Central government demanding an increase in crude oil royalty paid to the state.

The memorandum has sought to increase the oil royalty from the present rate of Rs. 192 per tonne to Rs. 800 per tonne.

The memorandum has pointed out that the state government had accepted the new royalty rate of Rs. 192 per tonne because Gujarat was passing through the worst phase of the communal violence and the anti-reservation agitation. Because of these pressing reasons and the bad economic situation, the state administration had accepted the low rate of royalty. It also wanted the Centre to evaluate a definite formula for fixing the royalty rate so that the new rates could be arrived at on a scientific basis. The memorandum is likely to be sent to the Centre in next few days.

EARNINGS FROM THE PRESS:

Demand for gas

India has been fortunate to locate substantial quantities of natural gas reserves, but the mismatch between its availability and utilisation has been conspicuous for various reasons. This is exemplified by the bitter experience gained from the use of gas supplied through the HBJ pipeline. The Andhra Pradesh government has, therefore, gone well to ask an expert committee to prepare a report in advance of gas availability from the Krishna-Godavari (K-G) basins. The report, which has been released, should prompt proper utilisation of gas to be made available in the next few years. It has identified priority areas for gas use in the state and pinpointed the need to be cautious about planning its use for other areas which are not commercially or technically viable.

Gas production potential in the K-G basin will be three million cubic metres per day by 1989-90. It is expected to go upto 5.3 million cubic metres by 1994-95. The fairly massive quantity of gas that will be produced will have to be channelled to industries utilising hydrocarbons for their fuel and feedstock requirements. ONGC has already lined up some potential consumers, but their cumulative demand falls far short of expected supplies.

The possibility of using the gas from the K-G basin as feedstock for petrochemicals is of course limited. Since the available gas is predominantly me-

thane, fractionation may not be viable, as stated by the committee. Therefore, fertilisers and power would be the two major priority areas. Apart from the existing and planned units, there appears to be good scope for more fertiliser plants based on gas in the region. The report has not spelt out the ideal size of these units since it will depend on the cost of gas at site and other economic factors. Part of the projected gas supply is meant to be used by power plants. The use of gas, however, does not seem to offer any advantage over coal (available in the state) in terms of cost of production. Nevertheless, a new power plant based on combined cycle gas turbines is said to be advisable, considering the overall shortage of power in the region.

The committee has surprisingly agreed to the use of natural gas as fuel directly by a number of industries (like ceramics, glass, metallurgy and electronics) "in view of the small quantum involved and the contribution to process efficiency and the value addition by utilisation of natural gas". In principle, this looks bad. What is small today may cumulatively eat up eventually a lot of this valuable hydrocarbon. While one readily agrees with most of what the report says, it must be added that the committee should have looked at the demand pattern for gas in the whole region. Perhaps, ONGC can do it.

— Economic Times

MAJOR IPCL, HOC, PETROFILS PROJECTS IN THE OFFING

The Indian Petrochemicals Limited (IPCL) and Hindustan Organic Chemicals and Petrofils will shortly commission several major projects to increase the country's self-sufficiency in chemicals and petrochemicals.

This was disclosed at a review meeting of these undertakings by the minister of state for chemicals and petrochemicals, Mr. R. K. Jaichandra Singh.

HOC has already started producing phenol at its Cochin plant which has a capacity of 40,000 tonnes. As a result, the country will become self-sufficient in this vital raw material used in resins and drugs. The present consumption of phenol is 35,000 tonnes per annum.

The Petrofils' acrylic fibre expansion project, according to an official release, is under commissioning and is likely to commence production by March. The project envisages establishment of manufacturing facilities for 12,000 tonnes per annum of both mono and bi-component acrylic fibre using dry spinning technology.

The IPCL's polypropylene copolymer project is likely to be fully stabilised in another two to three months and other projects of xylenes expansion and gas turbines are under way.

The release says the gross block of IPCL will rise to Rs. 1,500 crores by March 1988 and with the commissioning of the Maharashtra Gas Cracker, it will touch Rs. 2,000 crores by 1990.

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The Krishna-Godavari (K-G) Basin is emerging as a highly promising area for oil and gas production with as many as 63 wells drilled, including 34 offshore. Out of the 71 prospects in the Basin, 43 prospects have been tested, 18 are onland and 25 offshore.

ONGC has finalised arrangements for supply of 1 million cubic metres of gas/day which can be raised to 3 million cubic metres by the end of the Seventh Plan. Contracts have been signed for gas supply to 18 industries in Andhra Pradesh from the Basin, for which laying of 72 km-line from Narsapur to Kovvur is in progress. Gas from Narsapur has already reached Bhimavaram.

The Seventh Plan programme for K-G Basin includes completion of 46 wells (36 onland and 10 offshore) 17,213 SLK seismic surveys (6,075 onland and 11,138 offshore).

A sum of Rs. 447 crores is expected to be spent on K-G exploration efforts during the period.

More rigs are also being brought in to intensify the search. Presently, 5 rigs are operating in K-G onshore. It

is proposed to add 7 more rigs in the next two years.

A task force has been formed to develop the GS-16 structure under a crash programme. Six locations have been released. The immediate plan is to start drilling of four new wells.

PERSONALITIES

DR. S. C. AMIN

Dr. S. C. Amin, Ph.D., has joined our organisation on the 14th of December 1987 as the Managing Director.



MR. N. S. GAMBHIR

Mr. N. S. Gambhir, a graduate in Chemical Engineering, has taken over as General Manager of HOC's subsidiary Hindustan Fluorocarbons Ltd (HFL) at Hyderabad. Prior to joining HFL he worked in HOC as Chief Projects Manager. Mr. Gambhir is specialised in project planning, execution and production. The entire planning and execution of Polytetrafluoroethylene (PTFE) plant of HFL, which has already gone into production, has been done under the direct supervision of Mr. Gambhir. He has widely travelled in the country and abroad.

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Six major petrochem projects held up

The progress of as many as six of seven petrochemical complexes proposed to be set up in the public and joint sectors is so slow that they are not likely to go on stream before the end of the Seventh Plan, says a Financial Express bureau despatch.

With the sole exception of the Maharashtra gas cracker complex (MGCC), being set up by the State-owned Indian Petrochemicals Corporation Ltd. (IPCL) at Nagothane, none of the other complexes has got all the necessary official clearances yet. Work on commissioning these projects has therefore not begun.

The complexes which are not going to be set up by the end of the Seventh Plan are the Haldia petrochemical complex, aromatics complex at Saleempur in Uttar Pradesh, olefinic complex in Mangalore, aromatic complex in Madras, olefinic complex in Gujarat and olefinic complex in Vizag.

The natural consequences of such delays in clearances to these complexes are escalation in the cost of each of these projects and the drain of foreign exchange or imports of petrochemicals, which otherwise could have been obviated.

Haldia petrochemicals complex's progress was initially quite satisfactory after RPG Enterprises of Mr. R. P. Goenka joined hands with the West Bengal Industrial Development Corporation (WBIDC), in whose name the letter of intent was issued. The joint venture project in the joint sector obtained all the necessary clearances for foreign collaboration and product pattern.

But the project has now got stuck with the financial institutions, in particular the Industrial Development Bank of India (IDBI), which is going to be the lead financial institution for this huge project with a cost of over Rs. 1,400 crores. According to official sources, it is the hesitation on the part of financial institutions on release of funds to the tune of Rs. 1,000 crores that is holding up the work on the Haldia petrochemical project.

Official sources say the financial institutions' hesitation in this case is understandable as this is for the first time that such huge loans are going to be given to a single joint sector project. As such, the institutions are cau-

tious and examining the project's viability from all possible perspectives. But this delay has already ensured that the project does not get completed before 1990.

The aromatic complex at Saleempur in Aligarh district of UP is facing greater uncertainty. The letter of intent was originally given to the Pradeshia Industrial Investment Corporation of UP (PICUP) in March 1986. However, PICUP's search for a private sector partner proved futile and it could not firm up any collaboration with any company for executing the project even after getting an extension of the validity of the letter of intent for six months. The normal validity of a letter of intent is only for six months.

In view of PICUP's failure to take any concrete follow-up action on executing the project, the Government decided not to give any further extension to the letter of intent. As a result, the letter of intent lapsed and PICUP was out of the race for the Saleempur complex. The Government has now once again asked promoters to submit applications for obtaining the letter of intent for this project.

Official sources in New Delhi say that no application for obtaining the letter of intent for the Saleempur complex has so far been received by the Department of Chemicals and Petrochemicals. One of the companies, which is favoured by the Government for taking up the Saleempur complex, is the State-owned IPCL which has so far successfully adhered to all schedules of implementing MGCC at Nagothane.

But even if a decision on award of letter of intent is taken in the coming few months, there is remote possibility of this project being completed before 1990. The proposed aromatic complex in Madras is also embroiled in a similar controversy of which company should join hands with Madras Refineries Ltd. (MRL) which has the letter intent in its name, to implement the project.

According to information available at New Delhi, MRL has considered various options for executing the project, including those of collaborating with IPCL, setting up a new company to implement the project and of joining hands with a private sector partner. The Department of Chemicals and Pet-

rochemicals is still to hear from MRL on its final decision on how it will implement the project. The Madras complex has thus failed to even rope in the partners for setting up the project.

As regards the complexes in Gujarat, Vizag and Mangalore, the Government has not even issued any letter of intent. The proposal for setting up the Gujarat complex is now with the Project Approvals Board (PAB). The Department of Chemicals and Petrochemicals has favoured the splitting of the project into more than one division.

The idea is to award the cracker unit to one company and the other plants in the complex to other companies. Here the competition is mainly for bagging the cracker unit. Among the contenders are Reliance Industries Ltd., and the Gujarat Narmada Fertiliser Corporation (GNFC). But till a decision from PAB comes, no further progress can be made.

In the case of the Vizag project, only some days ago did the team from the Andhra Pradesh Industrial Development Corporation make a presentation to the Government to stake claim for the letter of intent for this petrochemical complex. The Government would have to take a view on this proposal and decide on whether to grant the letter of intent to APIDC, which in the event of getting the letter of intent will have to look for a private sector partner.

According to a review, the implementation of all these projects is to be completed only in the middle of the Eighth Plan. The only exception is MGCC, on which IPCL has already invested Rs. 838 crores as on December 31, 1987.

IPE PLANS TO REVIVE CRUDE OIL CONTRACTS

The International Petroleum Exchange is pursuing its plans to revitalise its crude oil contract and currently favours a 1,000-barrel contract based on North Sea Brent crude with cash settlement each month against an index or value for Brent on one of the contract's last trading days, an IPE spokesman said.

In late January, the New York Mercantile Exchange voted against a link-up with IPE. This link would have allowed dealers to trade NYMEX crude oil futures and options in London before New York opened.

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Long-term plan for mineral exports urged

The Federation of Indian Mineral Industries has suggested the appointment of 'mineral attaches' in countries like Japan, the US and South Korea and in Western Europe and West Asia to assess the market conditions and demand for Indian mineral exports.

In a study on export possibilities of minerals except iron ore, manganese, fuel and mica, the Federation said the trade missions in different countries should also be asked to assess the market conditions in regard to various minerals.

It has been pointed out in the report that the prospects of mineral exports from India 'are neither rosy nor bleak'.

'Much depends on how we cultivate the market and what is the attitude of the Government towards mineral exports', the report released in New Delhi says.

The report also suggests that there should be a long-term plan and conscious cultivation of the market and a national consensus on mineral exports.

The expansion in export or finding new outlets would depend on the co-ordinated efforts of the Government, mining industry and trade, it said.

It has been observed in the study that exports of minerals other than iron ore, manganese, fuels, mica, precious and semi-precious stones and diamonds, had shown an increase of 20 per cent during 1984-85, over the figures for 1980-81.

Their share in the total exports of the country had, however, decreased to 0.85 per cent from 1.24 per cent. Similarly, their share in minerals exports had decreased to 17.04 per cent from 19.17 per cent.

The report blamed the 'indifferent attitude' of the Government.

The study has evaluated the export potentialities of 26 minerals including barytes, bauxite, chromite, graphite, ilmenite, limestone, dolomite, granite, marble, fireclay, silica sand and slate.

On bauxite export, the report observed that this had suffered due to the Government's unclear policy. Despite India being near West Asia, the markets there had not been fully explored.

Although India should export the maximum quantity of alumina or aluminium, there was, however, a limitation because of an aluminium glut in

the international market, the report observed.

Potentialities lay in the export of bauxite for cement plant in West Asia and alumina for West Europe.

As regard limestone and dolomite, the study has suggested that India should attempt to export intermediary products but certain conditions should be afforded for making the exports competitive.

It says the export of granite, marble and slate could be substantially increased to Arab countries, Italy, France, West Germany and Japan.

The study has called upon producers to change the obsolete equipment and method of production and adopt new machines and techniques.

It also suggests that the exporters of such minerals co-ordinate their efforts by pooling their resources and arranging for collective shipping of the ores.

The study says it should be made incumbent upon State Governments to earmark a certain percentage of the royalty collected by them for the provision of roads, cheap means of transport and other infrastructural facilities in the mining areas.

CHANGES IN SSI LIST

The Union Government has dereserved cycle chains (except for captive consumption) from the list of items earmarked for exclusive manufacture in the small-scale industrial sector.

Simultaneously, it has revised the nomenclature of five items reserved for exclusive manufacture in the small sector.

The revised nomenclature for these items are synthetic knitted fabrics except high pile fabric made by silver knitting and synthetic knitted blankets, rubber blowing agents (DNPT), precipitated silica except fumed silica and spray dried silica, aluminiums including aluminium sulphate, industrial grade excluding its manufacture in integrated sulphuric acid plants and also recovery from waste toxic effluents and crown cork with cork wood lining (except for captive consumption) respectively.

The decision on dereservation of revision of nomenclature are being given effect through separate notifications.

The Government has also stipulated that after expiry of six months from the date of publication of the notification no owner of an industrial undertaking, other than those in the small sector, shall carry on business of the undertaking except under and in accordance with a licence issued in this behalf by the Union Government.

With the latest change in the list, the total number of items reserved for exclusive production in the small scale sector is 846. During the current financial year, the Government has thus removed four items (three were removed earlier) and revised the nomenclature of ten items (nomenclatures of five items were revised earlier).

HARI OM ASHRAM DONATION TO ATIRA

ATIRA has received a Donation of Rs. 50,000/- from the Hari Om Ashram, Nadiad to institute an Annual award for the most outstanding scientific or technological contribution in India in various fields of Textile Sciences, such as textile technology, textile chemistry, synthesis of dyestuffs, fibre science and designing of textile machinery. The award will be named "Hari Om Ashram Prerit Ranchhodlal C.I.E. Research Award Endowment".

The following types of scientific contributions in the above fields will be considered eligible:

- (1) Scientific/Technical achievement in textile technology, textile chemistry, synthesis of dyestuffs, fibre science and designing of textile machinery;
- (2) Solution of short-term critical problems facing the textile industry;
- (3) Process/Product development of commercial value to the Indian textile industry (Product would include machinery and instruments);
- (4) Outstanding contributions towards the scientific understanding of important phenomena in textile manufacture.

A Board of Trustees and an Expert Committee have been constituted for the administration of the Award Scheme. Detailed information with application forms will be available from the Director, Ahmedabad Textile Industry's Research Association, Post Polytechnic, Ahmedabad-380 015. Last date for receiving completed applications is 30th April 1988.

Nuchem plastics to diversify

World's first medium density fibre board project, using agricultural waste like cotton stalks, is being set up at Tohana in Haryana by Nuchem Plastics Ltd., with technical tie-up from Sunds Defibrator AB, Sweden, which would also subscribe to the company's equity capital to the extent of one million Swedish kroners.

According to Mr. Ramesh C. Barar, Mg. Director, Nuchem Plastics, manufacturer of thermosetting moulding powders like urea and melamine formaldehyde moulding powders and urea formaldehyde resins used as bonding agent in panel boards, the total project cost of 39,000-tonne per annum capacity medium density fibre board using agricultural waste is estimated at Rs. 35 crores.

He told newsmen recently that seven million tonnes of cotton stalks go waste in Punjab and Haryana cotton belt. By using this waste both as raw material and as a source of energy for the plant, agriculturists in the area would earn Rs. 4 crores. Since the product made from cotton stalks compared exactly with those made from conventional wood, the manufacture of medium density fibre board from agricultural waste would help the Government save scarce foreign exchange now spent on importing wood to meet the requirements of the panel board industry.

Apart from having properties of wood, based on the present input prices, a square metre of medium density fibre board would cost Rs. 105 for 19 mm thickness. This was 40 per cent cheaper than other comparable panel boards.

The demand for these boards was expected to be around 1,10,000 in 1991 against the present existing capacity of 30,000 per annum. Therefore, Mr. Barar felt confident of selling easily the entire production.

The break-even point of the project was expected to be at 25 per cent. In the first year of production, the unit would operate at 60 per cent capacity utilisation and subsequently the capacity use would be 90 per cent at the end of the fourth year of operation. The turnover at the end of the fourth year, at present prices, was expected to be Rs. 27 crores.

Out of the total cost of Rs. 35 crores, term loans to the tune of Rs. 23.62 crores had been already tied up. The company would seek public participation in the equity to the tune of Rs. 4 crores. About Rs. 3 crores would be met by internal cash accruals from Nuchem. The project was scheduled to be completed by 1989-end.

Tie-up with Japan Steel

Nuchem Plastics has also tied up with Japan Steel Works for manufacturing in India injection moulding machines incorporating microprocessor-based controllers.

The company is now manufacturing hydraulic powder compacting presses, hydraulic open throat presses, automould, hydraulic compression, transfer moulding presses, etc.

The company set up its chemical division in 1955 with the manufacture of urea and melamine formaldehyde moulding powder for the first time in India. The division now manufactures a wide range of chemicals used in thermosetting plastic moulding industry, chemicals and tubular plywood, paper, pharmaceutical industry, etc.

A major new project under implementation is a 300-tonne per annum production facility for polycarbonate to be set up as a new unit in Gujarat at a cost of Rs. 3 crores. The company has also plans to make a number of basic drugs with an envisaged investment of Rs. 50 crores in the next few years. With the new projects, the company hopes to achieve a turnover of Rs. 110 crores by 1990.

Separating salt from water

Nuchem has again come with a process to remove salt from water and thus make it potable with an economical process. The process is based on the indigenous know-how supplied by Bhavnagar Salt Research Institute. Now, Nuchem is commercialising the process. Initially, it will carry out the work in Haryana, Rajasthan and Delhi.

Water is not only life-supporting but an essential liquid for exploiting agricultural and mineral wealth. In many places there is immense accumulation of water resources which due to the high content of salt cannot be utilised for either drinking or farming. Brackishness is a term which applies generally to water with an excess of com-

mon salt or sodium chloride together with lesser amounts of other salts.

DeSal'in is the process applied by Nuchem for removal of ions by passing regulated electrical current through ion selective membranes developed after two decades of extensive research.

The process can be applied for bore-well or tube-wells in industrial complexes or housing colonies to supplement municipal water. DeSal'in process is also available in the portable form to be used in house holds with negligible cost. In buildings the desalinating unit can be run through solar energy. The Government has earmarked Rs. 4,800 crore for rural water supply. However, water available for these villages often require desalination. With the Nuchem process the desalination cost works out to be attractive.

According to Mr. Barar, the company has been asked to install the process in all the railway stations in Rajasthan. DeSal'in is a proven process as Central Salt and Marine Chemical Research Institute, Bhavnagar, has successfully commissioned nine plants at various locations in India. Major desalination plants in the world are based on similar principles.

ASSAM REFINERY TO BE IN CENTRAL SECTOR

The proposed oil refinery under the Assam accord would be established in the public sector and more specifically in the Central sector according to a communication to the Assam chief minister from the Union minister of state for petroleum and natural gas. It is learnt.

The chief minister meanwhile requested the Union ministry to indicate the position of the central government in regard to participation of the state government in the proposed refinery. The state government will take follow-up action on the project on receipt of confirmation from the Centre.

The state government had earlier sent a detailed note to the Centre requesting its decision on matters like capacity of the refinery, implementation and financial participation, site selection, formation of new company and release of invitation to private parties, if necessary.

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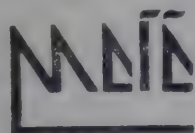


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POLLUTION CONTROL DEVICES:

Depreciation allowance hike likely

The Union Government is considering a package of proposals to provide more incentives to industries for installing pollution control equipment. The proposals include raising the depreciation allowance on pollution control devices and providing subsidy on consultancy charges for installing such devices.

These proposals are now before the Finance Ministry. The Industry Ministry has supported the case for providing such incentives, as it feels that the present levels of incentives do not encourage the existing industries to install pollution control equipment. Moreover, it is argued that Governments of industrially advanced countries provide more incentives to the industry for installing pollution control devices.

According to a note prepared by the Industry Ministry, it is suggested that the depreciation allowance on investment made in installing pollution control devices be raised to 100 per cent, as in the case of energy conservation

equipment. This would help both the industry and the users.

It is pointed out that at present the Government provides two main incentives for this industry. These are a 50 per cent depreciation allowance on the devices and system for pollution control and a rebate of 70 per cent on the water cess allowed to the industry if the pollution control devices installed are run to the satisfaction of the Pollution Control Boards concerned.

The 50 per cent depreciation allowance is provided as per a notification issued in February 1983. The notification provides the depreciation allowances to 19 specific equipment coming under three broad categories. These include electrostatic precipitation systems, felt-filter systems, dust collector systems and scrubber-counter current/venturi/packed-bed/cyclonic scrubbers under the category of air pollution control equipment and solid lime chrome mineral cryolite recovery systems.

The 15 specific water pollution control equipment enjoying the depreciation allowance are mechanical screen system, aerated detritus chambers (including air compressor), mechanically skimmed oil and grease removal systems, chemicals feed systems, mechanical turbulators and mechanical reactors, diffused air/mechanically aerated activated sludge systems, bio-filters, methane-recovery anaerobic digester system, air flotation systems, centrifuge for dewatering sludge and rotating biological contractors or bio-discs.

The Industry Ministry's note points out that the existing depreciation allowance and the 70 per cent rebate in the water cess have had a very marginal impact on the use of pollution control devices. This has failed to curb increasing pollution by industries just as it has failed to pep up the pollution control equipment manufacturing industry by creating more demand for such devices.

The proposal for 50 per cent subsidy on consultancy charges for waste reduction and pollution prevention studies is favoured as it is felt that motivating industries to reduce wastes and prevent pollution right at its source of generation will be prudent. This is because such motivational incentives for waste reduction will ultimately cut down significantly the overall national investment required for pollution control. It will also lead to increased productivity and profitability of industrial enterprises.

The Ministry has argued that investment on pollution control devices is a pure expenditure and in 90 per cent of the cases, it leads to an increase in production costs. Appropriate incentives are thus necessary to motivate industries to install such equipment. Governments in advanced countries have already established suitable incentive schemes.

The Industry Ministry has therefore pressed for more fiscal reliefs for use of such devices. The pollution control equipment manufacturing industry has also organised itself to plead for raising the depreciation allowance and other fiscal incentives. There are over 40 companies engaged in the manufacture of such equipment in the country.

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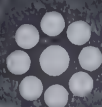
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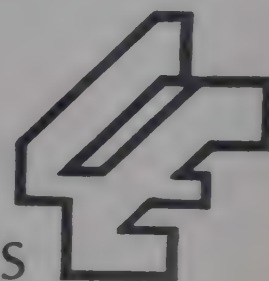
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CONFERENCE ON

Oil as Growth Engine for Chemicals & Petrochemicals

One day national seminar on "Oil as Growth Engine for Chemicals and Petrochemicals" was organised by the All India Manufacturers Organisation (AIMO) in Bombay on January 12.

The seminar was inaugurated by Shri A.S. Sharma, Maharashtra Minister for Communications, Tourism and Culture. In his inaugural address Shri Patil stressed that the growth of petrochemical industries should be fully exploited. The main thrust of the government for the seventh and Eighth Five Year Plans to achieve a spectacular increase in the output of natural oil and gas, facilities for processing and refining free gas for producing fertilisers and more petrochemicals and LPG, said Mr. Patil.

In his thematic address, Shri Suresh Sharma, Chairman, AIMO Council for Chemicals, Petrochemicals and Fertilizers noted that by the end of the century the country would need 25 million tons of fertilisers, and 12,000 million meters of synthetic fibres and yarn. Petrochemicals provided the only alternative to meet these requirements of the Indian population, Mr. Sharma felt.

The Inaugural session was followed by four technical sessions, highlighting the role of chemicals, synthetic fibres and yarns, oil and gas and petrochemicals.

Mr. H. Krishnamurthy, Chairman and Managing Director of Hindustan Organic Chemicals Limited delivering the Key-Note address in the first technical session on chemicals, stressed the need for a rational approach to solve the problems of alcohol-based industries. These industries were facing problems due to the Government's decision to license two units for the manufacture of acetic acid from methanol, an item traditionally made through the alcohol route in India.

While admitting a role for the alcohol based industries Shri Krishnamurthy also suggested that other uses of methanol particularly as a fuel admixed with diesel be studied. This he felt could lead to substantial increases in demand for methanol. (Complete text of Shri Krishnamurthy's lecture will be published in the next issue of *CHEMICAL WEEKLY*).

Delivering the key-note address at the second technical session on "Synthetic Fibres and Yarn" Shri Kapal Mehra, Chairman, Orkay Silk Mills Ltd., noted that domestic consumption of synthetic fibres would go upto about 48% of the total market by the year 2000. He

urged the removal of all duties on imports of textile machinery as it would serve as a spur to the modernisation of the industry.

Striking a note of caution Mr. S.L. Khosla, Chairman, Indian Oil Corporation (IOC), said that the logistics of feedstocks' supply from oil refineries and location of the primary petrochemical industries and their downstream units need careful examination.

Mr. Khosla stressed the need for a certain harmony in planning and operation of the basic petrochemical plants and oil refineries. "Preferably, they should be planned together", he said.

He said that the deficit in light refinery products like naphtha and motor spirit would be 1.6 million tonnes by the end of the 8th Plan (1994-95) and it would soar to 7.7 million tonnes by the end of tenth plan (2004-2005).

Of the middle distillates, the deficit of kerosene and HSD would be 6.4 million tonnes by 7th Plan-end (1989-90), which would rise to 39.8 million tonnes by the end of the 10th Plan.

Mr. Khosla said the country had a refining capacity of about 48 million tonnes now. This would be raised to 51.6 million tonnes by 1989-90, through debottlenecking the four existing refineries. The capacity would further go up to 61.2 million tonnes per annum in 1994-95, when the Karnal and Mangalore refineries would go on stream. But by that time the country's consumption of petroleum products would rise to 73 million tonnes.

Mr. Khosla felt that it would be impossible to import the entire anticipated shortfall of 17.7 million tonnes at the end of 8th Plan. It might be feasible, perhaps, to import only 5.4 million tonnes of middle distillates and to produce the rest of the petroleum products within the country by adding 12 million tonnes per annum new refining capacity and importing necessary crude oil.

Speaking after Mr. Khosla, Mr. Vineet Nayyar, Chairman and Managing Director, Gas Authority of India Limited (GAIL) suggested that India should reconsider its petrochemical policy and opt for natural gas route to petrochemicals, thereby conserving petroleum for the mounting fuel requirements of the country.

The Bombay High production has peaked and there has been no major new discovery

which will significantly add to oil production. The Oil and Natural Gas Commission has projected 50 million tonnes by the end of the century, which still leaves a massive deficit. Mr. Nayyar said.

The country cannot afford to bridge the gap with imports without distorting other sectors of its economy, Mr. Nayyar said. A policy decision can lead to gas accounting for 40 per cent of the hydrocarbon consumption by the turn of the century, he said.

According to him, there is a strong case for using gas in preference to naphtha as a petrochemical feedstock. Ethylene production from gas consumes about 50 per cent less energy. It also means higher output of ethylene -- 80 per cent compared to 63 per cent in case of naphtha route. It also requires lower investment.

Methane could be tapped for ammonia-based fertilisers, and ethane could be used for the manufacture of ethylene and downstream plastics like HDPE and LDPE. Propane, through hydrogenation, could be put to use for the production of propylene, polypropylene and the like, he said.

Mr. Nayyar and Mr. S.L. Khosla, expressed the new thinking in the Petroleum Ministry according to which naphtha may become a scarce commodity in the not-too-distant future. This again buttressed the need for tapping alternative routes to petrochemicals.

Traditional wisdom is against the use of gas for power production. For rapid increase of power base, gas was superior to coal. Recurring costs however, are higher for gas-based power plants as gas is more expensive than coal. Gas can also be viable as a domestic fuel in densely populated cities like Bombay and Ahmedabad, Mr. Nayyar said.

Energy consumption per unit GDP in India was twice that of Europe because of obsolete technologies and wastage, Mr. Nayyar said. Indian paper and pulp industry, for example, consumed four times as energy as its counterparts in OECD countries.

Despite modernisation, India's fertilizer industry consumed between 20 to 100 per cent more energy than OECD fertiliser units.

By 1995, gas production is estimated to touch 31 m. cubic metres, which is expected to increase to 40 m. cubic metres by the turn of the century.

NUKEM Bags RCF Award

M/s. Nukem Corporation, Bombay, won the "First Award for Methanol Sale" for the year 1986-87. The award has been installed by Rashtriya Chemicals & Fertilizers Ltd. At a glittering Republic Day function, Mr. Duleep

Singh, Chairman and Managing Director of RCF handed over the trophy to Mr. Sanjay Agarwal of Nukem. Nukem has achieved the unique distinction of the maximum sale of 1400 tonnes of methanol for 1986-87.



Mr. Sanjay Agarwal of Nukem Corporation is seen receiving the First Award for Methanol from Mr. Duleep Singh, Chairman & Managing Director of RCF at the Republic Day Function held at Bombay.

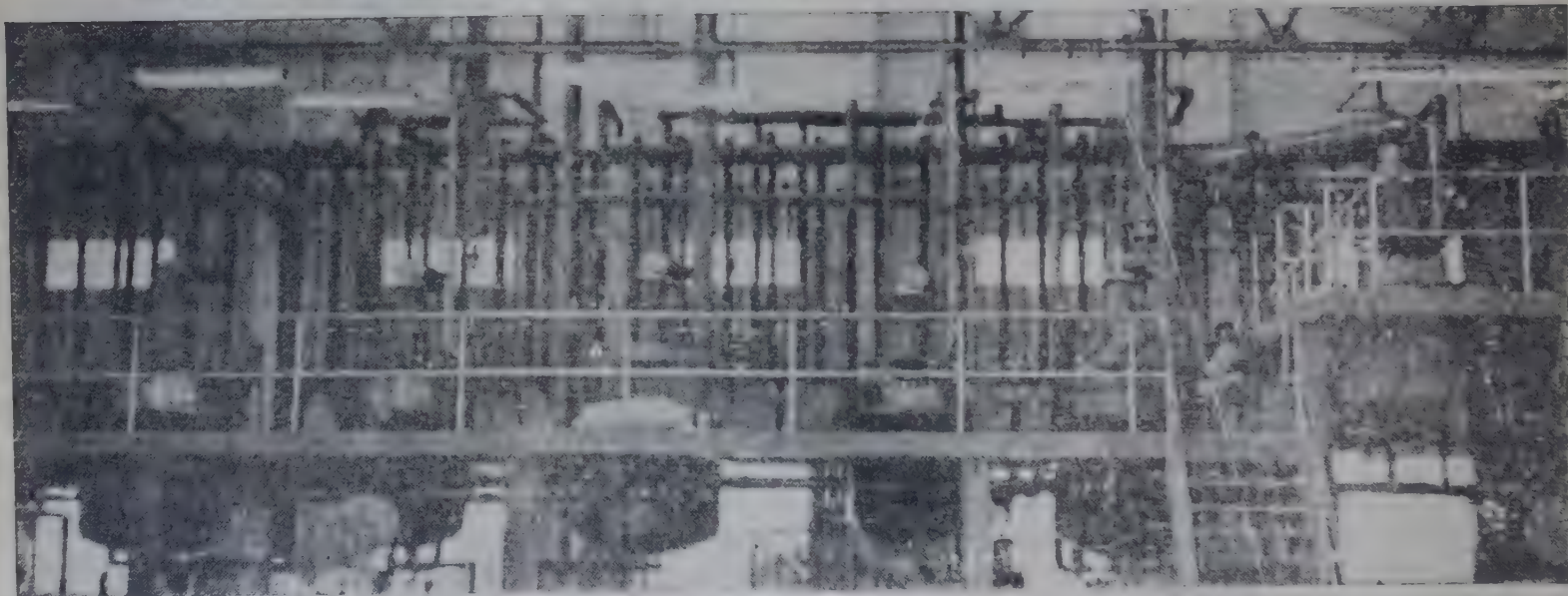
Nukem Corporation and the spirit behind the firm, Mr. G.P. Agarwal made a modest beginning in the year 1964. Undaunted by earlier setbacks, Mr. Agarwal surged ahead steadily and established a firm footing in distribution of methanol, nitric acid and other vital raw materials. "Prompt Delivery" was the keynote success of Nukem Corporation. Starting with the road tankers, Mr. Agarwal delivered goods at his customers' doors promptly. Today Nukem is a proud owner of 25 specialised road tankers to cater to the needs of its customers all over India, ensuring the uninterrupted supply of quality materials. Nukem has branches in all important cities of India.

Today Mr. Sanjay Agarwal, following the footsteps of his illustrious father, G.P. Agarwal, has not only expanded business and clientele but also able to reach the maximum sales of methanol, winning the prestigious RCF Award. Nukem will be celebrating its Silver Jubilee early next year.

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Highlights in Chemical Technology (Part 2)

SUPERIOR LITHIUM BATTERY UNVEILED BY BELL COMMUNICATIONS RESEARCH

Scientists at Bell Communications Research, Red Bank, N.J. have developed in 1987, a new rechargeable lithium battery prototype, which is reported to be more efficient and compact than other batteries currently in use. A patent coverage has been applied for this battery.

What makes the battery unique compared to other lithium batteries is the fact that it uses cathode of silver molybdenum sulfide. This cathode is easily recharged and operates at room temperature — unlike many other cathode materials. This innovative cathode has made it possible to develop a rechargeable powerful battery that behaves well.

The potential commercial uses are wide open — ranging from small to large size applications e.g. batteries could be considered for use in digital personal computers, to back up continuous functions (such as time and calendar) that normally rely on electrical power current, or the automobile industry could replace the conventional lead-acid and nickel cadmium batteries with the more energy-efficient lithium battery.

Further, the Company reports, that the new battery is much more powerful for a given weight compared to conventional rechargeable batteries and can easily be formed into a thin-film cell. This development paves the way for industries like watch manufacturers to benefit from a rechargeable power source. Further, these thin-film batteries can

be quite useful for maintaining information stored in integrated circuits. The company also foresees applications for this new battery in telecommunications industry. (*CMR*, 8/17/87, p. 21)

A NOVEL FLEXIBLE PAINT

Polyurethane fabrics that are used in helium filled balloons or blimps, often must stretch by 700% and that can pose a problem in selecting paints to decorate that kind of fabric or polymer. But now, H Marvel Guest Paints (Manchester, UK) has developed a flexible paint — trade name: Flexithane nonisocyanate polyurethane that cures by solvent loss to form a highly elastomeric film with good adhesion. The product can be sprayed directly onto an inflated helium-filled balloon or blimp.

For most applications two coats are sufficient to withstand constant deflation and reflation without cracking.

The basic formulation can be modified to produce fluorescent, translucent, metallic and opaque brushing paints. The British Company is aiming at other uses for Flexithane. It reports the new paint is also suitable for other flexible substrates, including polyvinyl chloride, polyurethane elastomers and rubber variants and fabrics. (*Chem. Wk.*, 1/11/87, p. 50)

WORLD MATERIALS CONGRESS IN SEPTEMBER 1988

ASM International, headquartered in Metal Park, Ohio, is the primary sponsor of the 1988 World Materials Congress. The major materials

event will be held in Chicago on September 24th-30th, 1988.

Secretary General of the International Congress is Allan Ray Putnam, Former Managing Director of ASM. Chairman of the Congress Organising Committee is Raymond F Decker, current President of the Technical Society. For further information contact, ASM International, Metal Park, Ohio, U.S.A. (*Ceramic Ind.*, 5/1987, p. 20)

AN ORGANIC POLYMER WHOSE CONDUCTANCE RIVALS COPPER

Researchers at the BASF Laboratories, Ludwigshafen, W. Germany have refined an organic polymer that displays the highest conductivity at room temperature for its weight of any known material. This is a new breakthrough in solid state physics.

This polymer may be the prototype for a long sought plastic conductor — one that could be much cheaper, lighter and more malleable than metal conductors.

The base of the conductor developed at BASF by researchers, Herbit Naarmann and N. Theophilon is polyacetylene, which consists of chains of carbon and hydrogen atoms. When it is doped with iodine according to a special process, the polyacetylene has a conductance of about 150,000 siemens (a siemen is the reciprocal of an ohm, the unit of resistance) per cm, the researchers report. That is about a fourth the conductance of an equal volume of copper. By weight the polymer is twice as conductive as copper, making it the world's most conductive material.

In its present form, the BASF material is not appropriate for widespread applications, because it lacks the major qualities that make plastics attractive. Polyacetylene does not dissolve in water or any other liquid, including acids. Moreover, it does not melt or become pliable when heated; instead it decomposes. More research may turn up related polymers that are both highly conductive and processible, by conventional means. Further, there is no reason to believe high conductance is specific to polyacetylene. (*Sc. American*, Sept. 1987, p. 22)

A NEW THIXOTROPIC FORM OF KEVLAR ARAMID DEVELOPED BY DU PONT

Du Pont has unveiled a new form of its Kevlar aramid, a pulp that can be used as a thixotrope for adhesives, sealants, coatings, caulking and mastics.

The Company reports that tests have shown that Kevlar provides formulators with an environmentally safe alternative to fumed silica and asbestos for viscosity control and reinforcement.

The material combines high temperature stability, good chemical resistance, increased tensile and tear strength with easy processability. Kevlar aramid pulp products are highly fibrillated fibres that are on average 0.08 and 0.16 inch. The pulp is available in two forms: (a) dry, for dry or solvent mixing processes and (b) wet, for aqueous dispersions. (*Chem. Wk.*, 11/11/1987, p. 50)

SUPERACID CATALYZE ALKYLATION OF XYLENE

The use of a variety of superacid heterogeneous catalysts has led to the alkylation of ortho-xylene by sty-

rene at conversion rates approaching 80% and little if any styrene oligomerization. This observation is reported by Prof. R.A. Rajadhyaksha, Professor of Chemistry at the University of Bombay.

The above researcher began his study by showing that conventional superacids, such as triflic acid, catalyze the desired alkylation in high yields, giving predominantly phenylxylythane, a compound used as a heat transfer and insulating oil. Treating zirconium, titanium and iron oxides with sulfuric acid produced —superacids— sulfated inorganic oxides — that superior catalytic activity. Prof. Rajadhyaksha believes that the Zirconium-based superacid is a promising industrial catalyst because of high thermal stability and low-cost. (*Chem. Wk.*, 4/25/87, p. 28)

NEWSPRINT FROM A HEMP-LIKE PLANT KENAF ON THE HORIZON

A hemp-like plant, Kenaf has successfully been converted into newsprint. A \$1.4 million demonstration project by Kenaf International Inc., may lead to the setting up of \$300 million, 215,000 tones/year mill near McAllen, Texas. The project backed by U.S. Department of Agriculture and KII, involved processing Texas-grown Kenaf into 20 tonnes of newsprint in a chem thermo-mechanical pilot plant at the Trois Rivières, Quebec facilities of CIP Inc; a Montreal-based paper producer. The Kenaf paper was used to print 83,000 copies of a newspaper owned by KII.

According to Marvin Bagley, a research team leader at USDA's, Northern Regional Research Centre (Peori, Ill) reports that Kenaf can also be processed conventionally in Kraft, soda, or sulfite pulp mills for about the same cost as wood pulp. Researchers found that Kenaf paper

is superior — in runnability (in new print forming machines), tensile strength, opacity, brightness and printability — to conventional wood pulp based newsprints from U.S. and equivalent to material from North Eastern Canada. Kenaf is an easily renewable resource — the fast growing plant matures in four months. Paper Researchers in India should also look to this technology for making newsprint. Can jute fibre be converted to newsprint? This is another interesting challenge for researchers. (*Chem. Eng.*, 11/23/87, p. 17)

A BIG MEMBRANE PLANT THAT RECOVERS NITROGEN

A novel on-site air separation membrane system has started last November (1987) to supply 17,000 cu ft. per hour of 97% pure nitrogen gas to a Bristol Myers Pharmaceutical Plant at Syracuse, New York. The modular plant was fabricated and will be maintained by Union Carbide's Linde Division. The Company foresees a niche for membrane air separation, both in the market now served by merchant liquid, as well as in the new market for lower purity gases. (*Chem. Wk.*, 11/25/87, p. 28)

A NEW ADSORPTION CYCLE REFRIGERATOR WORKING ON SOLAR ENERGY DEVELOPED IN FRANCE

A novel refrigerator developed by France's Brissontieau & Lotz Marine (Nantes, France) is comprised of 200-L solar powered unit and costs about \$3,000. Larger systems can be built by combining several units.

The refrigeration cycle begins after sunset when granular activated carbon — contained in two 1-m² solar panels — is cooled to below 60 degree C; meanwhile methanol held in a reservoir under vacuum,

absorbs heat from the 200-L refrigerator, cooling it to about 6 degree C. The methanol vapour flows up to the solar panels and is absorbed by the activated carbon. During the day, the cycle reverses. The activated carbon heats up to 100 degree C and desorbs the methanol; the partial pressure rises, the methanol gives off its heat to cooling fins mounted on the back of the panels, condenses, and flows (via a storage vessel) to the reservoir. For best operations, ambient temperatures should be under 43 degree C during the day and under 32 degree at night. This refrigerator is ideally suited for India. Our C.S.I.R. Laboratories like N.P.L. and N.C.L. should develop this technology for giving a big boost to refrigeration in our country. (*Chem. Eng.*, 11/25/87, p. 18)

A FASTER SYSTEM FOR ANALYSING LIGNIN CONTENT OF WOOD PULP

A faster system for analysing the lignin content of wood pulp has been recently marketed in U.S.A. by ASEA Co's Process Automation Division (Nulwankel, Wis) after extensive testing at 11 paper mills in Sweden. Developed by the Swedish Pulp & Paper Institute (STFI), the analyser replaces chemical/oxidation/titration techniques that can take as long as 30 mins to determine the kappa number, used in industry to represent lignin content.

The new system known as STFI OPTI-Kappa, uses two photo-detectors to measure the scattering and absorption of UV light in samples taken from three different points in the pulp-bleaching plant.

Using proprietary electronics, the light signals are then processed into a Kappa number. The whole process takes only 5 mins. Thus much faster response should enable paper

mills to more precisely control the bleaching process, especially since lignin content can vary rapidly. (*Chem. Eng.*, 11/23/87, p. 17)

THE FIRST LASERS TO AMPLIFY THE ENERGY OF CHEMICAL REACTIONS INTO VISIBLE LIGHT

The world's first ever lasers to amplify the energy of chemical reactions into visible light have been invented by a group headed by James Gole, a Physics Professor at Georgia Institute of Technology (Atlanta, Georgia). In lasers, an energy source is stimulated into a coherent beam when it passes through a substance having more atoms, ions or molecules that are excited than unexcited.

Gole reports that chemical energy is more effective in energizing molecules than are conventional optical lasers, which use large amounts of electricity. When fully developed these chemical lasers — both pulsed and continuous types have been developed — could thus be used wherever energy is at a premium, such as in outer space or in heavy industry.

Pulsed amplification occurs by reacting silicon or germanium with ozone, creating an excited, metastable metal-oxide molecule; this is contacted with a vaporized thallium atom, forcing it into a higher energy state. The atom escapes from this by emitting laser light.

In the continuous mode, three sodium atoms (Na_3) are reacted with halogen atoms, forming sodium halide molecules and molecules of two excited sodium atoms (Na_2) that emit laser light. Because Na_2 atoms emit light at a faster rate than they react with halogen atoms, laser-light emission is continuous. (*Chem. Eng.*, 11/23/87, p. 19)

E. MERCK'S RESEARCH MAKES SORBITOL A NEW UNIQUE TABLET EXCIPIENT FOR DRUG FORMULATORS

World Sorbitol production is estimated to be well in excess of 350,000 tonnes per annum, with a good proportion of this being used in the production of ascorbic acid (Vit C). In the pharmaceutical field, Sorbitol has been used extensively in infusion solution, sugar-free syrups but only occasionally in solid dose forms, but has been neglected as a medium for routine formulation work of tablets due to three reasons:

- Sorbital is moderately hygroscopic,
- The laxative effect of sorbitol and
- Only one type has been commercially available with little research towards modifying its physical structures and properties.

Research at E. Merck Ag., (Darmstadt, W. Germany), however, has opened up a new role for sorbitol as a tablet excipient. The company has developed a new physical form of sorbitol called Sorbitol Instant.

Sorbital Instant is prepared by a special spray-drying system (F. Reiff, et al, U.S. Patent 4507511, Eur. Patent Appl. No. 83111682.7) specifically designed for this compound. It uses a very pure grade of concentrated sorbitol solution, which after drying gives a solid having more than 90% of the delta-polymorphic form. The final product is found to be an agglomerate of loosely packed, randomly oriented, interwoven, filamentous crystals which bears little resemblance to the structure of conventional crystalline material. It is this unique structure which gives Sorbitol Instant its unique properties useful in making it

a true direct compression material in tableting.

Recent studies in Europe, have shown that Sorbital Instant has several advantages as an excipient in direct compression tableting:

(a) The force of compression required to obtain a given tablet hardness is considerably lower than that for lactose, dextrose, etc.

(b) Less Wear and tear on dies and tableting machines.

(c) Due to excellent flow properties of Sorbital Instant, it produces a negligible amount of dust, compared to other crystalline excipients.

(d) Binding capacity of sorbitol instant is superior to that of other conventional materials.

A project is in progress at the University of London involving Sorbitol/antibiotic combinations. This project will shed further light on the advantages of this new tablet excipient in direct compression.

To summarise, Sorbital Instant should be considered as an interesting excipient in the following areas: all direct compression applications, chewable tablets, sublingual tablets, tablet binder and media for reconstitution.

DU PONT UNVEILS BARRIER FABRIC

Tyvek Pro-Tech, a novel protective garment fabric launched recently by Du Pont is claimed to produce safer wear with the reliable barrier properties needed to protect personnel in the most hazardous envi-

ronments. Fabrics claimed to be light-weight but tough and chemically resistant are manufactured from continuous polyethylene fibres by a patented process. The fibres form a dense non-woven shield that efficiently resist contaminants with a median diameter of 0.12 μ m such as asbestos fibres.

The material can be coated with polyethylene to increase splash protection or laminated with Saranex-23 film for added hold out. Economic enough to allow disposal of contaminated garment after a single use, Tyvek Pro-Tech is chemically inert, water resisting and does not gather contamination. It is anti-statistically treated. In addition, the material has a high tensile strength and tear resistance, even when wet. It is a low-lint fabric. (*Mfg. Chemist.*, 12/1987 p. 25)

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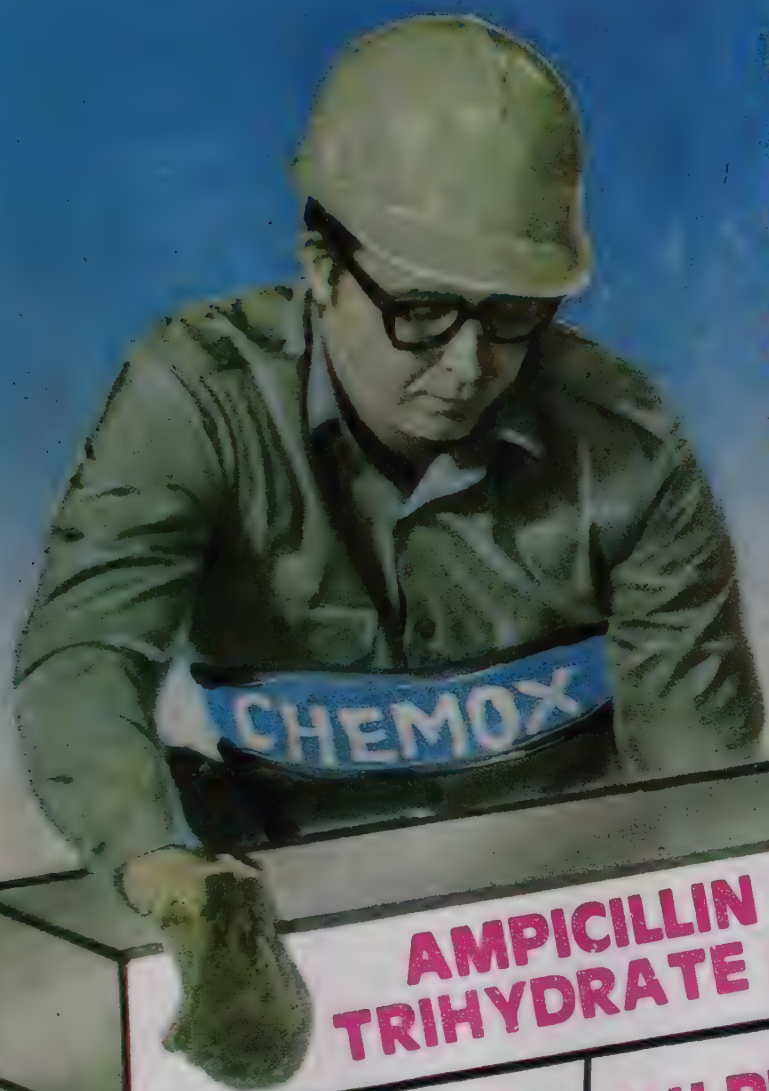
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23rd TANNERS GET-TOGETHER

Scientists, Technologists and Professionals from Australia, Belgium, Ethiopia, Indonesia, Italy, Somalia, Switzerland, UK, USA, West Germany and Zimbabwe joined their Indian counterparts at the Tanners Get-together (TGT), 88 at the Central Leather Research Institute (CLRI) from 28-30 January 1988. The meet, the twenty-third of its type enabled tanners to come upto-date on the recent advantages in leather science and technology.

The phenomenal developments that have taken place in the Indian leather industry have brought into sharp focus the technological constraints which will confront this industry in the next decade. To overcome this the industry must enter the era of electronics and computers. With this objective in view, the main theme of the TGT-88 was chosen as 'Modernisation of Leather Industry'.

The TGT-88 was inaugurated by Shri R. Prabhu, Union Minister of State for Fertilizers. In his inaugural address Shri Prabhu noted that "the Tanners Get-Together provided an unique opportunity for the leather industry to come in close contact with research scientists".

The leather industry, he urged should "play a positive role in providing cleaner environment to the people living in the vicinity of the tanneries and leather units". This, he added, was "one of the major challenges the industry has to take up during the next couple of years".

Two main lectures were held as a part of the TGT programme. The prestigious Nayudamma Science Foundation Lecture was delivered on 29th January 1988 by Prof. M.M. Sharma of the Bombay University Department of Chemical Technology. The subject of his lecture was "**Chemical Industry and Society**". (The text of this lecture is presented in the following pages).

The B.M. Das Memorial lecture was delivered on January 30, 1988 by Dr. A.D. Bailey, U.K. on the topic "**The**

Environmental Strategy for the Modernisation of the Leather Industry".

The CLRI had also arranged a popular presentation of its R&D initiatives on modernisation of the leather industry. The current research work in the frontier areas of leather science and technology were highlighted.

A panel discussion deliberated issues like external and internal constraints, financial climate in the coming years, technological perspectives, quality assessment and control strategies and the impact of frontier areas on science and engineering on leather technology.

The first Technical Session addressed itself to the modern concepts in raw material handling and this Session was chaired by Shri C.K. Duraivelan, Chairman, All India Skins and Hides, Tanners and Merchants Association (AISHTMA) with special presentations from Mr. William Carey (West Germany), Dr(Ms) Catherine Money (Australia), Dr. Heinz Keller (USA) and Shri Bhaskaran (India).

The second Technical Session was devoted totally to the modern concepts in the leather processing. It was chaired by Shri M.M. Hashim, Chairman, Council for Leather Exports. The key note lectures were delivered by Mr. J. Spahrman (West Germany), Dr. Wilhelm Pauckner (West Germany), Dr. Peter Latscha (Switzerland) and Dr. M.Tomaselli (Italy).

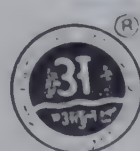
The concluding session of TGT-88 on 30th January 1988 was chaired by Dr. Ram K. Iyengar, Additional Director-General of CSIR, the Chief Guest being Shri K.V. Balakrishnan, General Manager of Southern Railways.

The special feature of TGT-88 was the release of a book on "Enzyme technology in beam house practice" written by two CLRI Scientists and published by the National Information Centre on Leather and Allied Industries located at CLRI.

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AYUDAMMA SCIENCE FOUNDATION LECTURE:

CHEMICAL INDUSTRY AND SOCIETY

Prof. M.M. SHARMA

University Department of Chemical Technology, Matunga, BOMBAY 400 019

The Chemical Industry occupies a pivotal position in meeting the basic human needs and desires and in improving the quality of life. It is extremely important to the economy and is an integral part of our everyday lives. We have a very high population base which may well cross the one billion mark by the year 2000 and thus, we face formidable problems in providing sufficient food, medicines and adequate shelter. The chemical industry provides the vital inputs required to augment the food production and save crops from attack by a variety of pests in a safe and selective way. The marked improvement in the average life of our countrymen can be, at least partially, attributed to the produce of the chemical industry which has provided the life saving drugs and chemicals required for public health. The problem of housing can be tackled only with the assistance of the chemical industry (C.I.). Thus, C.I. is all pervasive in everyday life and bestows on us innumerable benefits. We are in a 'chemical age' which is new and brings novel problems and chemistry is an unbelievably fluid science and has a fundamental impact on human life.

The C.I. is highly science based and is also an enabling industry and provides valuable, and often indispensable, inputs into various product-oriented industries. Thus, without the C.I., there would be no electronics or microelectronics, refrigerators, recording tapes, automobiles, laser discs, supermagnets, etc. Even the power industry depends a lot on the C.I. and indeed, modern boilers call for ultrapure water where dissolved solids have to be brought down to ppb level besides treating water for dissolved O_2 removal and for prevention of corrosion; insulation requires high polymers. Even capacitors critically depend on the C.I. In the case of the nuclear power industry, the dependence is similarly great. What is more striking is that the ancient civilizations had also felt the need for the C.I. as we know today.

We relieve pain and eliminate ulcers through safe drugs even though in their manufacture, we have to handle 'nasty' chemicals. The history of the C.I. is replete with examples of converting toxic and dangerous chemicals into safe value added products. Thus, one of the most poisonous substances, hydrocyanic acid, has been used to make synthetic wool (acrylic fiber), lactic acid, transparent plastic-polymethylmethacrylate, methio-

mine, etc. It is even more striking that gold, which is adored in our country, will not be available without cyanides. The so-called reactive dyes which are used for cottons will not be available without cyanides. Phosgene is essential in the manufacture of polyurethanes and polycarbonates and some drugs and agrochemicals. The C.I. is multidisciplinary, has an excellent track record of managing innovations and is a continuing shining example of the motto 'More from less' as the subsequent part of this lecture will bring out.

Apart from providing a variety of drugs for alleviation of human sufferings, from which our ancestors suffered in a chronic way, we provide safe anaesthetic agents and high quality artificial aids including a hip joint made from ultrahigh molecular weight polyethylene. We can provide injectable grade water through membrane processes which give a reliable way to remove virus and bacteria. Even dental aids depend on the C.I. and indeed we provide dental fills which can work *in situ* conveniently and artificial skin is around the corner. In the meantime, let us not forget new sutures, dialysers and contact lenses or spectacle frames which depend on the C.I.

We, chemical engineers are often described as stewards from the cradle to the crematorium. So, let us first start with a child and build my case of the society giving just and proper recognition to the C.I. rather than some individuals joining a hysterical crowd decrying solely some undesirable aspects of the C.I. Consider a diaper which has stringent requirements and is subject to stretching, pulling, pokes and tears. A diaper has to withstand compression and shear forces and is subject to intermittent loading with aqueous solutions of acids, bases and organics. We need high performance low weight and volume water absorbing material. In addition to the above and many other requirements, it has to be tender to skin and be manageable with one hand. A combination of cellulosic material, polyethylene, cis polyisoprene and an adhesive, based on polyisobutylene or polyvinyl alcohol and backing of polypropylene, is able to meet the exacting requirements cited above; the vital gap pertaining to water absorption is filled by the so-called 'super-absorbent polymers' which in their stride can take 100 times their own weight of water. The above principles are, *mutatis mutandis*, utilized for designing cheap and high performance sanitary towels.

We provide many chemicals from the small scale of a few tonnes to several thousand tonnes per year with extraordinary purity and often, impurities are specified at ppm and even ppb level. We provide optically pure materials and this becomes extremely important when it is recognised that one optical isomer can be a drug and the other one could be a poison, and in agrochemicals, one optical isomer can be a plant growth regulator and the other can be a fungicide.

CLOTHING

There is a mistaken belief that the king cotton is a panacea for our clothing and other requirements. First of all, let it be recognised that cotton cloth requires a lot of chemicals, apart from many finishing agents and dyes, before we can wear it and good apparel cloth may have upto 8-10% chemicals by weight of cotton. Thus, to believe that our clothing problems can be based, without chemicals, on renewable raw materials, is a myth. Indeed, the birth of the C.I. in India, at least partly, owes it to the demands of the cotton textiles industry. It is a different matter that for the cotton crop, we need sophisticated insecticides and fungicides. It will surprise many of you that over 50% of really highly priced insecticides are targetted for cotton crop. To clothe adequately our population, it would be foolish to think in terms of cotton as we just do not have the required land apart from the pressure of food and oil seed crops and, in any case, cotton is too expensive to maintain. Even regenerated cellulose like viscose rayon are no answer for our requirements — firstly due to lack of pulp, and secondly, all the chemicals, including the hazardous CS_2 , used in making rayon, go waste. We, thus have to turn to synthetic fibres and polyesters stand out as a shining example in view of so many desirable properties of these fibres, apart from ease of blending with cotton literally in any proportion. We have yet to develop fibres and blends which are suited to our habits and comfortable in hot, humid climate. We can improve these fibres either by chemically incorporating hydrophilic moieties into the polymer, which is somewhat expensive, or by generating an irregular, rough fibre surface through spinning modifications. We can expect breakthroughs in hosieryware so that our undergarments will be made highly durable and comfortable; thus, the inner fibre which comes in contact with the body is hydrophilic cotton but the outer one is the hydrophobic polyester and this woven combination is also conducive for migration and evaporation of water. Our new saris will be cheaper and more durable due to availability of subdenier fibres.

Let us now examine our requirements of winter clothing for civilian and military purposes. What hope do we

have of using wool? How many sheep will we require and how much of land will have to be earmarked? What impact will it have on the soil? Surely, it is clear that wool cannot meet our requirements and we have to go for blends and synthetics. In any case, even wool requires a lot of chemicals for processing and sheeps require veterinary drugs, including tickicides. For under-privileged people, the cheapest blanket can be provided through the use of polypropylene, possibly as non-wovens where the technology would involve air-laying processes for the fibres followed by mechanical or hydraulic needling. This blanket can resist water and would dry up pretty fast. Polypropylene fibres can be a cost effective boon for upholstery for public transportation and linens.

We are very fond of our ancient 'zari'. The present day zari which is cheap, durable and washable is based on metallised polyester yarn.

We take elastic fibres for granted. Have you wondered how the C.I. makes them and that some of them are based on urethanes which, in turn, use phosgene? Nylon socks which are long-lasting have become a common item; it is likely that, in coming years, blends based on polyesters, acrylics, polypropylene, will become more popular for socks. An umbrella of today's design is worth examining as the cloth is preferably based on polyamide and handles also use plastics. How about a raincoat — cheap or expensive? It is also a gift of the C.I.

INDUSTRIAL FIBRES

It would be pertinent to refer to high performance industrial fibres which have revolutionized the field of composites. The polyamide fibres are extremely versatile and carbon fibres are yet another breakthrough. From sports goods to bullet proof materials, we can see their fantastic impact. No natural material can beat them.

All types of fibres can be made essentially fire retardant both through the selection of co-monomer and through the addition of chemicals quite apart from the fact that fire retardant suits are available for the fire fighting personnel made out of polyaramid fibres. Surely we are contributing to nicer and safer clothing and industrial fibres and fabrics.

FOOD

I must turn my attention to the most vital requirement—food. There is no escape from the use of fertilisers and pesticides. The breakthroughs in agriculture are, of course, most welcome, but these would

and more fertilisers and as of now, we do not seem have alternatives for pesticides. The ever increasing demand for nitrogenous and phosphatic fertilisers would result in an investment of over Rs.10,000 crores before the turn of the century. What is the C.I.'s track record? Every year, the ammonia plant is improved and energy consumption goes down. We are now on the threshold of approaching the theoretical requirements. Let us not forget that synthetic ammonia manufacture is now more than 75 years old. We are now embarking on slow release fertilisers through appropriate coatings and large granule materials. We have yet to match the soil chemistry with crop and fertilisers. Our food availability would have grievously suffered if fertilisers were not made available and our self-sufficiency in food unquestionably owes a great deal to the C.I.

AGROCHEMICALS

The world of agrochemicals is most fascinating. Imagine, a chemical which 'sees' the difference between the plant and a weed or herb and selectively eliminates the undesirable material through the pre-or post emergent weedicide/herbicide. The naked eyes of humans cannot often distinguish between plants and weeds and the strategy of no-tilling would demand even larger quantities of weedicides/herbicides. The agrochemicals have to be lethal to pests but benign to mammals. How readily we take recourse to the use of pesticides in our households for flies, ants, termites, cockroaches, etc. Imagine the wonder world of chemicals which selectively get rid of rodents while being safe to humans. A lot of loose talk on eliminating the use of pesticides does not make sense as there are no alternative approaches which are really effective; pesticides are economically very attractive in augmenting food production and help immensely in increasing production of vegetables and fruits as well. We will need selective nematocides and we will have to develop procedures for encapsulated pesticides that their handling becomes much simpler and safer and more effective. We will have to be more imaginative in sprays hitting the target crops rather than disappearing in air which, apart from being harmful to personnel, constitutes a loss. The large public distribution system, which demands storage of over 25 mtpa of grains, requires proper fumigation in our weather which is adverse for storage.

The role of micronutrients is now beginning to be realized and the world of growth promoters is really fascinating. Imagine the advantages of sucrose in sugarcane or rubber in trees going up by 10% on a relative basis. What an economic impact these supposedly innocuous chemicals can make?

CATTLE WEALTH

We have not given adequate attention to our cattle wealth. We boast of perhaps the largest cattle population in the world but our milk yield is very poor and the price of our milk in relation to that prevalent in Europe/North America, consistent with the cost of living, is very high. The produce of the C.I. can help immensely the cattle health and yield of milk per cow or buffalo. We can expect improvement in the cattle feed, including through ammoniation of straw, and biotechnology may usher in improved processes for the upgradation of bagasse.

TREATMENT OF WATER AND CONSERVATION OF WATER

Water, even though the total receipts in India are high, is a scarce commodity and in many locations, including the great metropolis of Madras, drinking water poses serious problems. First of all, the C.I. enables water to be properly treated for drinking purposes, and this includes treatment with the 'bad' gas chlorine (elsewhere in the world, even ozone is used). The recent innovation of using ion exchange resins, containing a safe germicide based on quaternary ammonium compounds, is indeed laudable for it makes the drinking water safe as a simple attachment to the tap. The conservation of water in lakes, ponds, etc. is greatly helped by using evaporation retardant films which have to meet stringent requirements of stability at high wind speed. The conservation of water in soils in arid and semi-arid zones is greatly assisted by water superabsorbent polymers. This innovative technology has enabled higher yield in food and cash crops and has even benefitted horticulture. Here, we are now on the lookout, through an in-depth understanding of thermodynamics and kinetics, for polymers which will show thermal reversibility and where in summer, at temperatures like 45 degree C, water will be readily released; thus, whatever water in the soil was present during the winter time is retained and utilized gainfully.

PACKAGING

In India, we have witnessed gruesome denudation of forests which has changed the ecology in some parts of our country. A lot of wood is used for the packaging and paper industry, apart from its use as a fuel in rural parts of the country. The C.I. can provide effective answers at a very reasonable cost. First of all, rigid packaging based on wood can be completely replaced by high density polyethylene and polypropylene. The everyday example of a milk crate, based on the above polymers,

provides a homely case where even the noise of glass bottles is reduced and also their breakage. Quite apart, milk pouches in polyethylene film are now a common sight in India. The transportation of fruits like apples, grapes and tea can benefit immensely from plastic packaging materials. Further, breakthroughs are now emerging with barrier films and aseptic packaging. The life of perishable materials like vegetables and fruits can be enhanced in a marked and purposeful way by flexible barrier films which do not allow oxygen from the atmosphere to permeate. Aseptic packaging will avoid refrigeration and deep freezes may not be necessary and this can be a boon in India due to the high cost of freezers and interruptions in power supply apart from the high cost of power. Cheaper materials with the above characteristics based on polypropylene can be expected. It is truly amazing that every year, the redoubtable polyethylene film becomes thinner and stronger. It would be pertinent to refer to the use of thin polyethylene film of 15 micron thickness which is purposely made degradable with sunlight in agriculture for mulching. It is useful to ponder over the millions of tonnes of vegetables and fruits that are required in India and the price gap that exists between the farmer and the consumer. Even an improvement in the life of perishable goods by 4 to 5 days can make an immense impact.

The world of packaging is witnessing the real impact of the C.I. In our country, we have unique examples of packaging of fertilisers in 50 kg packs and perhaps we are the largest producer of high density polyethylene woven sacks. Imagine what would have been our fate if we were required to use only jute! The packaging of cement and salt provides additional examples. It is pertinent to refer to a very large number of 1kg/2kg packs that are required for edible fats. What a serious erosion of our resources would have occurred if we were to depend on tinned containers! It would be fair to say that the produce of the C.I. has gone to the lowest strata of our society in the field of packaging. We need to remind ourselves that even used newspapers sell at a fancy price and it is bad material to pack our oily foodstuff as the harmful ink leaches out. Further, glass is expensive and breaks easily.

FURNITURE

Our furniture requirements are assisted in a major way by plastics; laminates on table-tops have reached every nook and corner of the country and public transportation systems and railways use them extensively. We have serious problems associated with the availability of timber and the C.I. fills this gap in a purposeful and cheaper way; very sturdy doors, which can withstand

termites, are now made from plastics. Our travel kits are now made in polyethylene/polypropylene/ABS and flexibles based on PVC/acrylics/polyamides/polyesters are now a common item. Imagine the situation if the chemical industry had not stepped in! Let me remind you that vinyl chloride monomer is toxic but PVC is safe and even packaging for food is done with PVC films. The field of insulation depends critically on the C.I.; we do not have any cork and in any case, for higher temperature, it is not useful. The ease with which chairs can be made from plastics and the manner in which these can be stacked is laudable.

HOUSING

We have a terrible backlog of houses and shanties/slums can be witnessed all over the country. The only way by which cheaper housing can be undertaken to clear the horrendous backlog of 30 million houses is to use plastics in a major way. Even the roofing made from the fibre glass reinforced plastics has several advantages including the benefit of sunlight which is denied when we use asbestos sheets and corrugated iron sheets. The job of plumbing is greatly facilitated due to PVC/HDPE and this is all the more important as in many locations in India, dissolved salt concentration is 500 to 1000 ppm and for sanitary purposes, brackish water is widely used. Every home today has plastic mugs, buckets, combs, etc. We can develop innovative filled and foamed plastics based on indigenous cheaper materials. The role of polymer additives in cement is yet to be realised and holds a great potential particularly in coastal locations.

The safety in the use of electricity in homes has been greatly helped by the availability of high class insulating materials and better switches. We are now looking forward to conducting polymers such as those based on polyacetylenes.

Have you wondered how a non-stick pan for making a variety of Indian cuisine is possible? It is redoubtable polytetrafluoroethylene which achieves this task in a facile way.

The scope of using high polymers in different areas is immense and we have a dismal situation of our consumption being less than 40% of that in China and less than 25% of that in Brazil, let alone the western world.

ADHESIVES

I do want to gently remind you that adhesives of yester-years based on gums/starches have literally van-

ed and we now use far more functional and easier to apply polyvinylacetate/polyvinyl alcohol based materials and this has also improved the life of, say, books as these adhesives are not attacked by white ants. The world of engineering (structural) adhesives is unique—we can join metal to metal, metal to glass, plastics to plastics and what not. Even ammunition life can be improved when these high performance adhesives are used and leaky joints involving hazardous gases/chemicals can be conveniently handled on site. Do remember that even teflon tape has now become a common item where earlier a strange combination of lime, molasses and jute was used to stop leakages from household and industrial fittings.

INDUSTRIAL FABRICS

Filtration of difficult and corrosive materials can now be handled with high performance industrial fabrics based on polypropylene/polyester/polyamides, etc. Geotextiles, particularly those based on cheaper polypropylene, are expected to make a big dent in our civil engineering work.

ENGINEERING PLASTICS

Engineering plastics like polycarbonates, acetals, urethanes, etc. can fulfil a variety of functions. Thus, polycarbonate is transparent and street light covers, windows in public places, etc. can be made from this material which is shatter proof and thus vandalism can be contained; riot police shields are now made from this material and even baby feed bottles are made from this material as this is unbreakable and can be sterilised. It is often forgotten that even electronic items, including consumer electronics, would have at least 10% of the cost contributed by performance plastics. The magnetic tape which is so essential in audio equipment, computers, etc., critically depends on the C.I. Today, even a pen or ball pen depends critically on the C.I.

Polyester films are now being used for a variety of purposes, including for drawings, high quality packaging, etc. Performance plastics are now on the threshold of being used for new designs of syringes for injection of drugs into humans and animals; ease of sterilization coupled with unbreakable nature makes them attractive apart from being able to operate at higher pressures.

MEMBRANES FOR SEPARATIONS

Membrane separations, based on special polymeric materials, are now making an important impact. We can, with a very simple module, enrich air to 35 to 40% O₂

which is immensely helpful even in boilers, quite apart from providing a sturdy, compact unit for health services which can be used even in rural areas. It would not be long before we start using membranes based on inorganic materials and newer polymeric materials which will allow us to carry out separations at temperature upto 600 degree C.

ELASTOMERS

High performance elastomers allow a longer and more reliable life and can even result in saving fuel. A remarkable development has been the use of thermoplastic elastomers which allows the waste material to be recycled quite apart from the ease of processing like that of thermoplastics. Thus, large scale (millions of pairs) production of cheap canvas shoes can be achieved. Please do not forget that it was cheap PVC that brought out our famous chappal revolution which saw the poorest of peoples having footwear. Have you wondered why in some types of tubes in bicycles, air stays on for very long periods? It is high performance butyl rubber (and not natural rubber) which gives low permeability for air.

MISCELLANEOUS POLYMERIC MATERIALS

We now have special polymeric materials which permit us to coax crude oil to come out of the wells and which allow easy, troublefree transportation of waxy crudes, petroleum products and even allow an increase in the capacity of existing pipelines. They are now making in-roads in transportation of coal slurries.

You must not have failed to notice the use of plastics in table and ceiling fans which make them lighter and consume less electricity. Let me mildly remind you that the very article you use in the morning — a toothbrush — is all plastic material.

For painting of our homes and industrial finishes, it is basically all synthetics now. We should appreciate that we now have washable walls and these paints are long lasting. Further, any surface can be painted and ready to use paints are available in packs where no stirring is required.

SPORTS GOODS

Sports goods also depend a lot on high polymers. Thus, consider modern versions of rackets for tennis and badminton — from guts to the frame. High performance carbon fibre reinforced frames have become lighter and stronger. Further, lawn tennis depends largely on synthetic turf. What about table tennis? The ping-pong balls

are all plastic and the rackets have rubber covering. The golf ball is largely based on high polymers quite apart from the tennis ball. The nets that are used in sports fields are also based on synthetic materials. Thus, our sports enthusiasts can come to their own conclusions regarding consequence of 'if we were not there'.

DETERGENTS AND TOILET SOAPS

It is useful to examine the great impact the C.I. has made on household and industrial detergents and personal products. We have succeeded in showing a way out from the use of fats for making laundry soaps which, in any case, are not very functional in our hard waters. We now use synthetic detergents of different types including a cake type configuration. Newer varieties based on alpha olefin sulphonates are very well suited to hard waters. We can even make toilet soaps without fats or with a limited use of fats. This is highly relevant in India as we have been chronically short of edible oils and fats and we have to make every attempt to upgrade marginally non-edible oils into the edible category. In the recent years, we have had imports of oils to the extent of Rs.1300 crores per annum. You must have noticed better varieties of detergents in the market. With more extensive use of polyesters and blends, we will need different types of synthetic detergents.

With industrialization and large transportation systems, we need special types of detergents for cleaning, and the C.I. provides the right materials to achieve this objective in a facile way. Thus, our cleanliness owes a lot to the C.I. We provide surfactants which can emulsify two incompatible liquids; even food grade emulsifiers are available. We also provide demulsifiers and flocculants which allow colloidal particles to be conveniently removed from liquids. Perfumes and flavours have become an integral part of life. A good toilet soap contains more than 1% (by weight) perfumery chemical. Vanilla is a household name and most of it is made synthetically. We are a community which is fond of good smell and good flavour in our cuisine. Even camphor, which is widely used in temples, is all synthetic and perfumes in joss-sticks are also largely synthetic. Let us not forget that even a simple item like nail polish depends on the C.I. and a lot of bangles which are unbreakable, are based on plastics like cellulose acetate/cellulose acetate butyrate/ABS, etc.

BIOTECHNOLOGY

Biotechnology, which is an equal opportunity area, is now making a big dent particularly in difficult synthe-

ses, diagnostic kits, synthetic insulin, etc. Of course, the oldest and most 'energetic' product alcohol, known from Vedic days, should not be overlooked. Let me, however, bring to your attention a couple of examples. Take citric acid as an acidulant. The biochemical route is the only viable route and one single plant is the equivalent of several millions of lime. We can now provide sweeteners which are tasty, safe and more cost effective. It is generally believed that we do not have substitutes for sugar which give equivalent energy, although synthetic sweeteners — a gift of the C.I. — are known to laity. The High Fructose Syrup is now produced globally at a level exceeding 5 mtpa which is equivalent, in terms of sweetness, to more than 6.5 mtpa of sugar (sucrose). This is made from enzymatic isomerization of glucose in turn obtained by enzymatic hydrolysis of starches. In India, a lot of sugarcane plantations can be replaced advantageously by food crops. It should be recognised that the sugarcane is a twelve month crop, requiring irrigation and a lot of other inputs and this period allows three crops to be realised. Biochemical upgradation of bagasse for better cattle feed can be a great boon to our 'white' revolution.

For our vegetarian population, we see clear possibilities of making useful edible proteins to supplement normal sources. Lipase catalysed inter-esterification can give us substitutes for cocoa butter from our own raw materials.

AUTOMOBILES

Automobiles depend heavily on the C.I.; plastics have contributed immensely in bringing down the weight of an automobile and the fuel consumption has progressively gone down and at least a part of this achievement is due to the C.I. The C.I. has provided new rubbers and additives to give tyres which weigh less and last longer. Let me refer to a problem of recent origin — namely, the treatment of exhaust gases to bring down CO. It is breakthrough in a multifunctional catalyst which has solved the problem of auto-emissions. The two-wheelers are making increasing use of plastics. Thus, the C.I. has proved to be an enabling industry even in this difficult area in the domain of transportation.

INFORMATION

The C.I. has played an important role in modern information technology which has transformed our contemporary living. Silicon chip of 6 nine(+) purity, printed circuit boards, fibre optics, etc. have all been possible due to the existence of the C.I.

PHOTOGRAPHY

Photography for essential requirements and for pleasure has directly benefitted from the C.I. It is a nice example to show fast photochemical reactions in action, and in colour photography, fast to ultrafast colour changes are involved. The role of interface science is great. Have you wondered how gelatin is purified and used and how emulsions have to conform to very rigid standards? The process of developing films, which critically hinges on chemicals, has now gone to villages.

C.I. AND ARCHAEOLOGY

The C.I. is helpful even in this human endeavour of archaeology as labelled carbon dating greatly facilitates arriving at the antiquity. Further, a lot of products from the C.I. are used for cleaning, restoration, etc. Even the underwater exploration requires a gas which is a mixture of oxygen and helium.

ENVIRONMENTAL POLLUTION AND ACCIDENTS

The C.I. has often been bitterly criticised for environmental pollution. However, it is ignored that more than 125 years ago, it was the C.I. which proposed and implemented recycling and change over to safer and lesser pollution processes. The C.I. is often accused of emitting foul smelling gases but it is overlooked that we provide chemicals like aqueous hydrogen peroxide which takes care of foul substances in gaseous and liquid streams coming from even such activities as meat processing. Every human activity leads to some changes in the environment. The C.I. has championed the motto 'Convert liabilities into assets' and indeed, a number of products that we use today owe their origin to by-products which had practically no value. The most well-known example is recovered sulphur from H_2S from a variety of sour gases which now contributes to the extent of more than 50% of the annual global production of sulphur. Some other classical examples are lignin, diphenyloxide/diphenyl heat transfer fluid, argon, formic acid, etc. Even the classical sulphuric acid and nitric acid plants are operated today with highly efficient utilization of 'S' and 'NOx', respectively, thereby giving increased production of acids and lower emissions into the atmosphere.

By its very nature, some environmental impact is bound to exist. The more pertinent question is—whether it conforms to specified best practicable standards and whether we have an intrinsically safe operation. The society has every right to pose these questions and captains of C.I. are clearly answerable on these counts. The

frequent recycle of the Rhine water in continental Europe is a good example. However, objectivity should occupy a key position and not scaremongering and chorus with a hysterical crowd and let facts not be bypassed to make a 'good' story in the media. Captains of the C.I. owe a duty to be rightful communicators of facts. We need to recognise that in this process, we have objective listeners and frequent repetitions seem to be one way out to get the message across.

We should be consistent in our proper and just criticism of things that are not right in our everyday lives. Thus, we ought to be very critical of civic amenities, water drainage, occupation of footpaths, treatment of sewage, etc. While we are fully justified in being concerned with, say, a minor leak of ammonia from an ice plant, why are we not critical of stinks due to dead animals lying unattended for long periods and why are we not very critical of domestic solid wastes lying for unusually long periods and local authorities not disposing them in the manner they are required to. Why are we not so critical of accidents in construction industry and in transportation through road, railways and water?

Our familiarity seems to lull us on the major artefacts—dams. We do continue to put up large and small size dams even though these could well be a source of great risk. An objective analysis reveals that the risk is far too small against the immense advantages these artefacts offer and hence we go ahead and rightly so. We do not wipe out plantations as workers face dangers due to reptiles but we take steps to overcome the menace due to these creatures.

When we find that a particular area falls under seismic zone, we do not run away but recognise this feature and build houses and industrial structures accordingly. It would be naive to pretend that after all the precautions we have taken we are completely safe should an earthquake strike.

LINKAGES WITH LEATHER INDUSTRY (L.I.)

The L.I. depends heavily on the C.I. and right from the stage of raw hide to the finished leather, chemicals are extensively used. The L.I. is yet another example of how the C.I. helps in achieving the objective of 'more from less'. How poor quality material is upgraded into high quality material through chemicals? The quantity of chromium salt to be used for tanning has gone down drastically to approach theoretical values leading to insignificant discharge into waste streams. The case of shoe uppers provides an excellent example of the indispensable use of chemicals from the stage of tanning to

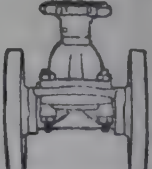
proper treatment to improve life, impart softness and water repellancy while retaining the 'breathing' characteristics of the leather. The use of acrylic resins, polyurethanes, etc. has made a major impact. A small amount of a chemical prevents fungal growth which is surely highly undesirable and we can treat leather in such a way that stains are avoided. The bottom part of footwear is now predominantly in synthetics and a reference to thermoplastic rubbers has been made. Synthetic high performance adhesives are indispensable in the L.I. The use of chemicals becomes all the more important when it comes to garments and other fancy goods to impart softness, 'feel', etc.

The C.I. has helped in arriving at proper procedure to deal with liquid effluents from the L.I. as these have striking resemblance with some effluents in the C.I.

Biotechnology is also making an impact in the L.I. by way of new effective and cheaper enzymatic processes. Synthetic leather is a commercial reality and leather cloth has almost completely supplanted upholstery based on leather.

CONCLUDING REMARKS

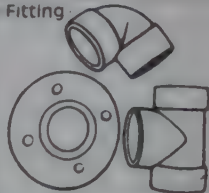
The C.I. has been a powerful engine of change and has definitely bestowed on us innumerable benefits and the society ought to properly recognise these highly desirable features of this high science based industry. Some undesirable features of the C.I. are too few to mar the highly desirable features. We are meeting ever increasingly sophisticated needs of the society. The C.I. is also an enabling industry and many sectors depend critically on its products; even the L.I. depends critically on the C.I. We have a good track record of inventions and managing innovations. We work on a wide diet of feedstocks and we offer 'a la carte' and composite meals. We are a shining example of achieving 'More from less'. The C.I. is unquestionably making our lives better, happier, healthier and more secure. In coming years, the C.I. is likely to gravitate towards a function-oriented industry where an integrated range of products and services will be offered and not merely based on supplying particular chemicals. We are the most polygamous amongst different types of industries and have played an important role in wealth creation.



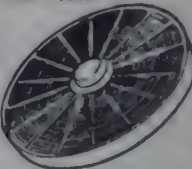
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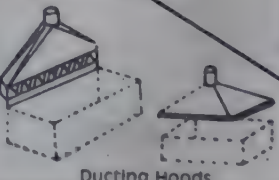
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Scrubber



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Ducting Hoods



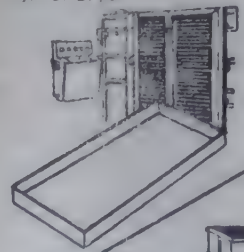
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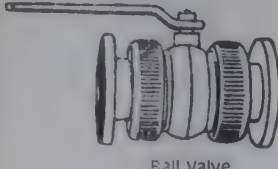
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ABSTRACTS FROM SOME OF THE PAPERS PRESENTED AT THE TANNERS GET-TOGETHER

BLUE : THE MANUFACTURING AND TRADING, Heinz Keller, Prime Tanning Co., Inc. Berwick, A.

le leather producing countries could be divided into having excess raw material such as the U.S. and Antina or net import such as Italy and Portugal. Historically hides were traded in salted and dried form. During the last decade a new form of preservation and curing of wet blue had emerged. The discussion of the manufacturing process for wet blue was given and the advantages for the customer were discussed. Those are good preservation, reduced pollution load, proper selection for grade and thickness, reduction in shipment weight if split material was purchased.

ALTERNATIVES TO CONVENTIONAL CURING AND HANDLING OF RAW HIDES AND SKINS, Catherine Money, GSIRO, Division of Protein Chemistry, Australia.

Conventional salt curing is being replaced by either green processing of unsalted hides and skins or by alternative salting methods, including brine curing and drum salting. Short-term processing by chilling or chemical methods is used to facilitate green processing. It is desirable that as many hides and skins as possible are converted to some form of part-processed stock at or near their source. When this is not possible, the most efficient, suitable salting method should be used. This paper compared the alternative methods for preserving hides and skins and described the changes in handling and processing which were being adopted, particularly by the Australian industry.

TRENDS AND TECHNIQUES FOR PROPER HIDE AND SKIN DELIVERIES, Bhaskaran, Retired Technical Advisor, Hides & Skins and Animal Industry Projects, UN/FAO.

Suggestions were made based on observations and experiences in developed and developing countries on the collection, curing, preservation, grading and marketing of hides and skins. The exchange earning leather industry must be helped to obtain quality raw materials and the technical developments in this field should help ultimately, to overcome the problem of environmental

pollution caused by salt in particular.

NEWER PROCESS TECHNOLOGIES FOR TANNERIES WITH PARTICULAR REFERENCE TO THE ECOLOGICAL PROBLEMS, W. Pauckner, Westdeutsche Gerberschule Reutlingen.

The subject of the lecture was as follows: "Newer process technologies for tanneries, with particular reference to the ecological problems". It is necessary to make such an addition when discussing the above mentioned subject, since most of the latest technologies are the results of the ecological situation of our environment. Each individual stage of leather production was systematically considered.

DISPOSAL OF TANNERY WASTES, David A. Bailey.

Disposal Options:

- | | |
|----------|---------------------------------|
| To sewer | -- discharge limits and charges |
| To river | -- strict discharge limits |
| To sea | -- not usually available |
| | -- increasing controls |

Pre-Treatment:

Needed whether to sewer or river:

- | | |
|-------------|--|
| -- To sewer | : to protect sewer and lives
corrosion (sulphides and acidity)
health (sulphides, solvents)
explosion (solvents)
costs (saves charges) |
| -- To river | : reduces cost of secondary treatment
reduces elements toxic to process
reduces constituents limiting sludge disposal |

NOTE:

- The best pre-treatment is AVOIDANCE!
- good housekeeping (brush and hose)
 - conservation of water
 - environmentally sound processes (UNIDO)
 - separation of troublesome but unavoidable spent process liquors.

QUALITY IMPROVEMENT OF HIDES AND SKINS IN INDIA, M.S. Mohanty.

The need for quality improvement in the basic raw material has been stressed to get better and high realisation of the finished leathers. The deficiencies of the existing practices in flaying and curing have been spelt out. The existing conditions of grading hides and skins, the methods of purchase have been highlighted. The problem encountered in transportation of raw hides and skins and suggestions to overcome the same had been made.

In order to effect quality improvement in hides and skins, scientific methods and legislation measures, if necessary, had been called for.

TECHNOLOGY FOR SOAKING OF HIDES AND SKINS USING ENZYMES, R. Puvanakrishnan and S.C. Dhar.

Soaking is the first operation in the tannery in which fresh or preserved hides and skins are treated in water for making them clean and soft. Hides and skins are received in the tannery in one of the four conditions viz. (i) fresh, immediately after flaying (ii) wet salted (iii) dry salted and (iv) dried. For optimal soaking of dry salted and dried hides and skins, some chemical or enzymatic agents are employed to rupture the linkages and to solubilize and remove the interfibrillary cementing substances. Soaking is accelerated by detergents, sodium tetrasulfide and nitrogenous compounds like dicyandiamide. But, use of these chemicals results in the increase of pollution load of the soaking effluents. Hence, an alternative technology by the use of enzymes as soaking aids is to be worked out. In this paper, the different methods for the soaking of hides and skins have been discussed in detail. The effects of different factors on soaking viz. temperature, pH, disinfectants, detergents and chemical additives have been analysed. Recent researches on enzymatic soaking agents and the advantages of enzymes as soaking aids have been critically examined.

AN APPROACH TO SALTLESS CURING OF SKIN, M. Siva Parvathi, Mahadeswara Swamy, S.C. Nandy and K.V. Raghavan.

In conventional curing of skins by wet salting, 40-45% common salt is applied on green weight. As a result, large amount of common salt is accumulated in the tannery and creates considerable problem to the disposal of tannery effluents. An approach has therefore been made to cure skins with reduced quantity of salt by using

biocides along with salt. In a preliminary study various biocides have been tried either individually or in combinations along with 10% common salt and their efficacy has been determined after 2 months storage at about 30 degree C. Skin quality was determined qualitatively by observing physical conditions and 'hair-slip' and quantitatively by estimating the extractable hydroxyproline nitrogen and the proteolytic activity of the skin extract. In a subsequent study, the efficiency of the biocides used along with 5% common salt has been studied upto a storage period of 6 weeks.

With a view to eliminate common salt completely, freshly slaughtered skin samples have been stored at lower temperatures e.g. 8, 4 and 0 degree C for one month and then the skin quality has been determined. Pretreatment of skin with biocides before cold storage has produced better preserved skins compared to the untreated ones.

PREVENTION OF FUNGAL GROWTH IN PICKLED PELTS AND TANNED LEATHERS FOR PRESERVATION, G. Suseela Rajkumar, R. Ramesh and S.C. Nandy.

The influence of various pickling and tanning agents on the preservation of pickled pelts and tanned leathers has been investigated. Use of certain organic acids, eg. salicylic and formic acids appreciably prevent fungal growth in pickled pelts for a considerable period but their efficacy is neutralised when the pelts are chrome or vegetable tanned. However, incorporation of fungicides to pickle liquor inhibits fungal growth in pickled pelts as well as in finished leather but the efficacy of the fungicides appear to be slightly reduced. The inhibitory effect of various individual tanning agents on fungal growth in leather is found to vary appreciably. Formaldehyde and some synthetic tanning agents appear to be the most effective whereas chrome and myrobalan tanned leathers are readily susceptible to fungal growth. Since formaldehyde/synthetic tanning agents cannot be used as a sole tanning agent various combination tannages have been tried. The combinations of wattle and zirconium, wattle and aluminium sulphate and formaldehyde and chrome seems to be quite effective in preventing fungal attack. Fungal growth in chrome blue can also be prevented by treatment with effective fungicides.

A NEW METHOD FOR EVALUATING SOFTNESS OF LEATHERS, V. Arumugam, M.D. Naresh, T. Ramasami and V. Subramaniam

There are very few objective techniques for assessment of leathers, although in case of textile fabrics, the

ending parameters such as rigidity and bending modulus have been used to assess the handle, drape and shape retention characteristics. The bending parameters have now been estimated for a series of leathers for upholstery, upper, softy upper, garment, gloving and shoe. It was observed that Peirce flexometer and Tinius Olsen apparatus that are conventionally used for determining the bending parameters have certain limitations in their application to soft garment leathers although for upper leathers could be assessed using such techniques readily. The load required to bend garment leathers being very small, conventional techniques could not be applied. A new technique using Instron has now been devised. The present apparatus, using the method of cycling, has the advantages of high sensitivity coupled with cycling capabilities and continuous loading rather than the stepwise loading in other conventional methods. In this preliminary study, the effect of curvature, rate of bending and type of leather on the bending parameters, such as coercive couple, low curvature modulus, residual curvature and bending recovery has been investigated. These parameters have now been correlated to the softness of leathers as judged by the conventional subjective methods so that a more reliable quantitative grading could be achieved.

ESTIMATION OF CHROMIUM (VI) BY A SIMPLE BIPOTENTIOMETRIC TITRATION TECHNIQUE, K. Sasirekha, P. Riyazuddin and S. Sadulla.

Sophisticated instrumental techniques such as Spectrophotometry, Atomic absorption, Polarography, Amprometry, Anodic stripping Voltametry and Radio release analysis have been reported for determination of chromium in natural and waste waters. However, these instruments/techniques are expensive and they cannot be adopted for field analysis nor they can be operated by semi skilled personnel. The bipotentiometric method described in this paper is a simple, precise and accurate method for the routine determination of chromium at microgram level. The method employs a commonly available pH meter and simple circuitry for constant current source. Cr(VI) species react with iodide and the liberated iodine is titrated against standard sodium thiosulphate. Experimental conditions and treatment of analytical data will be discussed.

PROSPECTS OF RUBBERSEED OIL IN LEATHER INDUSTRY, K. Vijayalakshmi, Geetha Baskar, K. Parthasarathy, N.C. Krishnan, S. Krishnan, V.V.M. Rao and S. Rajadurai.

Rubber seed oil available to the tune of 4000 tonnes per annum has good scope as a lubricant in leather

making. This oil similar to linseed oil and tobacco seed oil in its composition can be suitably modified to obtain water emulsifiable oil products. The developed products are evaluated for their performance on leathers as fatliquors for their physico chemical characteristics.

DEVELOPMENT OF PHOSPHORYLATED FATLIQUORS AND THEIR APPLICATION IN THE MANUFACTURE OF SOFTIE LEATHERS, Geetha Baskar, K. Vijayalakshmi, K. Parthasarathy, V.V.M. Rao, K.S. Jayaraman and S. Rajadurai.

Castor oil based fatliquor with its water emulsion stable to acids and salts has been developed by introducing the reactive groups such as SO_3Na and PO_3Na in the fatty chain. The lubricant introduced in the pre-tanning and tanning operations has resulted in the production of leathers with improved softness, fullness grain tightness and strength characteristics as compared to leathers processed in the conventional manner.

USE OF KERATIN HYDROLYSATE FOR BETTER CHROME EXHAUSTION, G. Ramamurthy, P.K. Sehgal, S. Krishnan and Mahendra Kumar.

Disposal of tannery hairs obtained from lime-yard poses many environmental problems to a tanner. This material is very rich in keratin protein—the fibrous protein of connective tissue. Keratin hydrolysates (solubilised keratin, KH) prepared from the material earlier, was employed in the rechrome bath for better chrome exhaustion of the bath and more chrome fixation to leather. Two sets of experiments were conducted on goat skins. The skins were first chrome tanned by the standard procedure. In the first set, KH was added in the rechrome bath after rechroming operation was complete. In the second set, KH was added prior to rechroming operation. In both sets, different concentrations of KH were used to obtain optimal requirement of KH for better chrome exhaustion of the bath and more fixation of chrome to the leather. Control lots without KH were also run. Total chrome, in the exhaust liquor and in the leather before and after adding KH in the bath was estimated for each experiment. Data on physical properties of leather was also obtained. Results obtained suggested that KH helps in better chrome exhaustion of the bath and more chrome fixation to the leather when added at 4% level to the bath in both sets of experiments. It is also found that use of KH in rechroming stage also helps to cut down the percentage of syntans and fillers required for retanning. Based on the results obtained, the process was upscaled in our tannery to assess the commercial aspects of the use of KH for better chrome exhaustion.

STUDIES OF POLYURETHANE COATINGS ON LEATHER BASED ON TDI AND POLYOLS, Rajesh Kumar, S.K. Misra, Sanjeev Gupta and G.N. Mathur.

One component polyurethane coatings based on propylene glycol, polyethylene glycol, castor oil and 1:4 butane diol with toluene diisocyanate have been synthesised. These samples were sprayed on base coated leather. Effectiveness of different types of polyurethane coatings have been evaluated measuring various physical and fastness properties viz. tensile strength and percentage elongation, flexural endurance, water penetration resistance, dry and wet rub fastness, scuff resistance and chemical resistance etc.

A SIMPLE BIAMPEROMETRIC METHOD FOR DETERMINATION OF SULPHIDE IN ALKALINE LIQUORS, S. Ali Mansoor, P. Riyazuddin and S. Sadulla.

A simple biamperometric method for determination of sulphide in alkaline liquors is described. This method minimises/eliminates difficulties and errors associated with conventional titrimetric methods for determination of sulphide.

STUDIES ON SHRINKAGE TEMPERATURE AND CROSSLINK RELATIONS, Usha Ramamoorthy and T. Ramasami.

It has been a general practice to measure shrinkage temperature to monitor the completion of most tanning processes for example chrome tanning. It is generally believed that shrinkage temperature as well as isometric tension could be correlated to the number of crosslinks formed during tanning. This raises a fundamental question as to whether the microscopic phenomena such as shrinkage of leather could be correlated directly to a molecular level crosslink formation and could be taken as a measure of tanning. It is of interest to investigate as to what type of molecular level interactions are associated with the dimensional stability of collagen and leather and is there a cleavage of crosslinks during heating and the application of stress.

Both untanned and formaldehyde tanned rat tail tendons have been subjected to the measurements of isometric tension as functions of temperature and the concentration of formaldehyde used for tanning. For untanned rat tail tendons, two relaxation processes were observed when 20% of strain was applied. The analysis of relaxation behaviour as a function of temperature reveals that the activation energy for primary relaxation events is less than 10 k cal mol⁻¹, indicating that forces undergoing change or rupture are more of

short range weak interactions such as hydrogen bonding rather than any covalent type interactions. The results of stress-strain and electron microscopic studies will be presented for both untanned and formaldehyde tanned rat tail tendons, which indicate the limitations of correlations involved between number of crosslinks and strength or shrinkage temperature.

EFFECTS OF HARD WATER IN LEATHER DYEING, S. Chandra, N.S.K. Srinivasan and K.N. Joshi.

As most of the tanners encounter the problem of dyeing due to hardness of water, a study has been made on the effect of hard water on full chrome upper leather and semi chrome goat upper leather using Acid, Acid Milling, Direct and 1:2 metal complex dyestuffs and results discussed. The application of instrumental color measurement method for compiling data on color differences, hue and chrome has been detailed.

AN APPROACH TO ELIMINATION OF SODIUM CHLORIDE IN PICKLING, K.A. Shanmugasundaram, K. Venkata Boopathy, K.S. Jayaraman, W. Madhavakrishna and V.S. Sundara Rao.

It is known that excessive concentration of chloride and other soluble salts increases the osmotic pressure and also induces sodium toxicity in susceptible species, in addition to the effluent containing sodium chloride making the soil infertile. In tanning process, major amount of sodium chloride is released in soaking and pickling operation and when it is combined with the total effluent, the concentration of sodium chloride exceeds considerably. For chloride removal so far no inexpensive treatment technology is available. However the modification of beamhouse process may help in reducing the pollution problem due to salt. In order to reduce the chloride concentration in total effluent an attempt has been made to pickle the leather instead of salt by using a new product developed by CLRI. The waste water analysis of pickling by this method gives 95% reduction of chloride concentration comparing to the conventional method. The leathers produced by this method are also comparable to conventional method.

TUFTAN AN UNIQUE MATERIAL FOR LEATHER, V.B. Singh, P.K. Kaushik, K.S. Jayaraman and J.K. Khanna.

M/s. Shri Ram Fibres with Central Leather Research Institute have developed a product "TUFTAN" based on polyamide. By application of this product, only 5-10% of the offered chrome is let out in the effluent as against 25-35% in the conventional chrome tanning. Data

Regarding the chrome in the leather and the effluent are as compared with the conventional chrome tanning. Application of the newly developed product during chrome tanning affords higher fixation of Cr_2O_3 in leather, less untreated chrome sulphite in the effluent, with improved dyeability of leather at the same time imparting a filling effect without reduction in the strength. Data on strength are also given.

EFFECT OF BIOCIDES USED IN THE TANNERY ON THE GROWTH AND METABOLISM OF PADDY SEEDLINGS, T. Leelapriya, S.C. Nandy and P.T. Kalaihelvan.

In leather industry certain bactericides are used for the curing and preservation of raw hides and skins and different fungicides for the prevention of fungal growth in pickled pelt, chrome blue and finished leathers. Such biocides are generally considered to be toxic and are also expected to influence soil ecosystem and plant growth when tannery effluents containing such biocides are discharged into the fields. In the present investigation the effect of certain commercial biocides on the growth of rice seedlings and its metabolism has been studied. All the biocides examined have affected seed germination and the morphological characteristics of the seedlings. Certain metabolic activities like protein and amino acid synthesis and total carbohydrate contents are found to be retarded but chlorophyll and RNA synthesis enhance by increasing concentrations of the biocides.

ENVIRONMENTAL SAFER METHOD OF UNHAIRING OF HIDES AND SKINS, V. Raju, S. George, R. Uma, S. Amudeswari, M.R.V. Krishnan Kunthala Jayaraman, Chandra Babu, D.K. Das and K.S. Jayaraman.

A raw hide or skin undergoes a series of treatments before being finally converted into the finished leather. Depilation/unhairing is one of the treatments carried out prior to tanning. This is conventionally carried out by lime and sulfide, which creates serious problems such as environmental pollution and discomfort to tannery workers. The use of enzymes for unhairing or depilation has long been desired, as these problems encountered in the liming process are overcome largely by the biological process. This paper studies a safe and viable alternative to the conventional method of unhairing. The unhairing agent used is a protease produced by a species of *Bacillus*.

Process optimization conditions have been established and is presently in the pilot plant scale of operation. Microscopic analysis of the unhaired pelts shows

that the unhairing carried out with the enzyme is as effective, if not better than, the conventional method. The enzymatically unhaired pelts have been taken to the level of tanning and have shown to be of acceptable final quality. Details of the process optimization are also presented.

COMPRESSIBILITY MEASUREMENT AND THE OBJECTIVE ASSESSMENT OF SOFTNESS OF LIGHT LEATHERS, B. Lokanadam, R.C. Nayar and V. Subramaniam.

This paper describes a simple method of measuring numerically the softness of grain garment leathers based on the "COMPRESSION INDEX", obtained from compressibility measurements; which would be of value in the assessment of the quality of leather objectively and semi-quantitatively. Most of the assessment and grading of leather quality is subjective and is based on the appearance and feel in case of grain garments. Although in case of sole leather, flexibility, rigidity, bending, compression, etc. are assessed using instrumental methods, true objective assessment of softness in case of grain garment leathers has been difficult. Further, many of the testing procedures for the measurement of softness of leathers are based on destructive techniques. This paper suggests a non-destructive method and attempts to define degree of softness of leathers using measurable parameter such as compressibility. The method seems suited for all types of light leathers and consists of compressing leather surface laterally in between two flat objects and the change in thickness in a given time is noted at different load intervals. From the analysis of compressional data, 'Compression Index' is obtained. Compression indices thus obtained may seem to correlate the softness of grain garment leathers with higher negative slope angles being associated with soft leathers.

INSTRUMENTAL METHODS OF FORMULATING COLORANTS IN SEMICHROME BUFF-CALF GLAZED ANILINE UPPER LEATHERS FOR MINIMUM VARIATION OF SHADE, R. Venkatachalapathy, T. Rangaswamy, K. Parthasarathy K.S. Jayaraman and K.V. Raghavan

E.I. Buff calf leathers were processed into semichrome leathers and dyed to medium pale orangish brown shade and assorted according to shade variation of the dyed crust, guided by the CIELAB scale colour values and also visual assessment. The assortments were yellowish, orangish, greyish tone variations. Dyed crusts were again assorted with colour values after spraying with protein binder, fixed and glazed. The CIELAB colour

scale difference values between each assortment of dyed, glazed and the target shade are used to fix solvent dye proportion in the staining coat; small pieces in each assortment were used for this. Full pieces were stained with solvent dye mix as decided by the colour difference values by spraying.

Small pieces of the stained pieces were sprayed with protein binder and fixed and glazed; the colour difference values between this and the target shade was used in tinting the season top coat with transparent pigments. Stained full pieces were sprayed with season, fixed and glazed. The colour difference in different portions of leather and leather to leather and between the target shade was found to be minimum.

OBJECTIVE ASESMENT OF JET BLACK AND VIVID RED ON RESIN SHEEP NAPPA GARMENT LEATHERS WITH TRISTIMULUS COLORIMETER, R. Venkatachalapathy and N.S.K. Srinivasan.

Quality assessment of Jet Black and bright shades on Resin finished Sheep Nappa garment leathers using Tristimulus colorimeter was attempted. CIELAB scale colour difference between standard permanent Black and Standard Vivid shade, including total colour difference e , Redness- Greenness, a and Yellowness. Blue-ness b between standard and test piece was used in assessing the colour quality.

Tables of CIELAB scale colour values, colour difference values between dyed crust stage, stained stage, seasoned stage and lacquered stage with the Standard Black, Standard Vivid Red on enamelled plate were

presented. Colour quality assessment instrumentally was found to be quicker than visual assessment and without ambiguity.

ELECTRODIALYSIS AS A MEANS TO RECOVER AND REUSE CHROMIUM IN SPENT CHROME LIQUORS, B.G.S. Prasad, J. Raghava Rao, T. Ramasami, K.V. Raghavan, Premraj Shah and A.A. Khan.

One of the major constraints in the direct re-use of spent chrome liquor has been due to the presence of neutral salts like sodium chloride and sodium sulfate which reduce tanning efficacy. Although the re-use of chromium recovered after precipitation as chromic hydroxide has been examined earlier, the process control and other operational difficulties have rendered commercial exploitation of such techniques difficult. Further, much of the techniques employed to recover and reuse chromium do not attempt achieving water of reusable quality. Electrodialysis offers a powerful technique to selectively separate chromium from other neutral salts using ion exchange membranes. In this work, the author report the successful separation of chromium from neutral salts using ion exchange membranes and electrodialysis. Sodium chloride and sodium sulfate have been removed to the extents of 90% and 50% respectively from spent chrome liquors with less than 9% loss in chromium through electrodialysis passing current of 4 amps. for 9 hours at a flow rate of 35 ml/second. Unlike other recovery procedures the composition of chromium remains unaltered even after electrodialysis as evidenced from the species-wise data of the cationic components. The results of a pilot level study are presented in this work.

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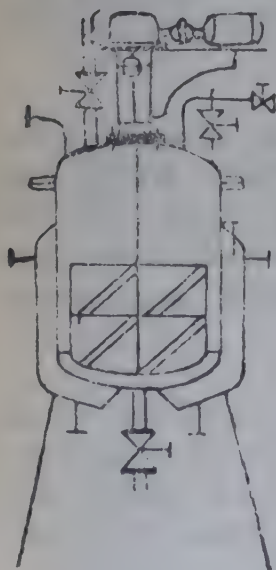
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INDIA INTERNATIONAL LEATHER FAIR 1988 — THE LARGEST EVER LEATHER SHOW IN INDIA

The Trade Fair Authority of India had organised the India International Leather Fair at the historic Rajaji Hall, Madras from January 31—February 6, 1988. The earlier two fairs held during the same period in 1986 & 1987 at Valluvar Kottam and Rajaji Hall respectively created considerable awareness about the growth potential of India's leather industry and attracted extensive attention about the importance of this annual event. Inclusive of local sales, export business and import trade, the business transacted at the fairs was quite encouraging and it is hoped that the current fair will pave the way for further business generation and upgradation of domestic technology.

The IILF'88 is expected to provide a unique opportunity for the exposition of a wide range of machinery and equipment required for the technology upgradation of the domestic industry. At the same time, the Fair should enable the domestic leather industry to fully exploit the present boom in the leather market overseas and to give a fillip to the drive for diversifying the product-mix of the export stream in keeping with the fact that leather has been identified as a 'thrust' product in our export effort.

INAUGURATION

In a brief ceremony, the Minister of State for Industries, Mr. M. Arunachalam, and the Trade Fair Authority Chairman, Mr. Mohammed Yunis, lit a traditional lamp to mark the occasion.

Earlier in a message to the organisers Mr. Yunis said that "the fair will provide an ideal forum to promote exports of finished leather and leather manufacturing. It will also give them the opportunity to upgrade their technologies by adopting the latest machinery and equipment displayed by overseas participants".

EXTENSIVE SCALE :

The Fair this year was planned on a much larger scale than ever before in terms of display area, profile of participation and product coverage. As many as 165 business firms took part in the fair, over a sprawling area of over 4500 square meters. The foreign sector comprised displays of 55 companies from Belgium, Czechoslovakia, Federal Republic of Germany, France, Italy, U.K. and U.S.A. The Italian Trade Mission in India had organised under its banner the participation of 24 renowned leather concerns. The exhibit profile in the for-

foreign sector ranged from hides, finished leather and synthetic leather for shoes to tanning machines, footwear machines and accessories, hydraulic clicking and skiving machines, superlator machines and thermoplastic footwear sole machinery.

The foreign participants included some of the leather concerns of world repute such as Bombelli, Bruggi, Fortuna, Moscona Verona, Lorenzin and Aletti from Italy; Heusch from Federal Republic of Germany; Mercier Freres from France; Strojimport from Czechoslovakia; BUSM and Dueflex from U.K. and International Shoes Machine Corporation from U.S.A.

In the domestic sector 110 leading firms participated not only in the finished leather and chemical segments but more importantly in the leather products sector from various parts of the country. Indeed this participation response from the domestic industry is typically reflective of the latest trends in the leather industry with emphasis on value-added products compared to mere exports of finished leather and other semi-manufactured supplies.

ACCENT ON BUSINESS ORIENTATION :

To ensure business orientation and facilitate serious business negotiation, the first three days of the Fair namely February 1—3, were exclusively reserved for business visitors. The entry to the Fair during these days were regulated on the basis of a business registration scheme.

BUSINESS DELEGATIONS :

A number of buyers and business delegations from Australia, Belgium, Bangladesh, Denmark, Finland, German Democratic Republic, Norway, Somalia, South Korea and Switzerland attended the fair. These visits are expected to result in the generation of substantial on the spot business.

SEMINARS :

A series of technical seminars was also being organised to coincide with the Fair. The topics of the seminars were as follows:

'Leather and Footwear Technology' & 'Collaboration Possibilities' by Italian Trade Commission.

'New Frontiers in Leather Technology' by National Small Industries Corporation.

'Perception of Buyers regarding India's Export Potential' by Council for Leather Exports.

FAIR FACILITIES:

A detailed framework of facilities had been worked out to enable the exhibitors to take part in the fair in an orderly, business oriented and effective manner.

A major facility related to the issuance of import licences on priority basis to foreign participants at the rate of Rs.3000/- per square meter of space booked subject

to a maximum of Rs. 25 lacs. The sale of exhibits was being permitted against valid import licences within the bond period allowed for re-export. This facility was also available to actual users who are eligible to import the same type of goods under Open General Licence.

The need for bank guarantee for temporary importation of exhibits had been dispensed with. Power requirements for demonstration of various machines put on the show were fully met and as much as one megawatt of power load had been provided at the site. Many other services such as banks with arrangement for foreign exchange dealings, a telecombureau with STD and telex facilities, etc. were also provided. A restaurant run by Welcom Group was also in operation at the site.

CLE AWARDS FOR LEATHER EXPORTS

In recognition of meritorious export performance in respect of different products of the leather industry, The Council of Leather Exports have instituted the CLE Best Export Performance awards. These awards for 1986-87 export performance were presented at a function organised in Madras on 31st January, 1988. The Honourable Minister Shri. M. Arunachalam, Minister of State for Industrial Development who was the Chief Guest at the function gave away the awards.

ABOUT THE COUNCIL :

The Council for Leather Exports, sponsored by the Ministry of Commerce, Government of India, is the nodal agency in the country to promote export of leather and leather products. Set up in the year 1984, the Council has, over a period of 3 years, endeavoured to project the image and capabilities of all segments of leather industry in India in different parts of the world. Invariably all persons and companies who export leather and leather products are members of this Council and over 2200 exporters are at present on the rolls of the Council.

The leather industry in India has become the fifth largest foreign exchange earner for the country and by all indications, the industry is likely to reach a higher position in the near future. Exports scaled Rs.930 crores in 1986-87. In 1987-88, the industry hopes to exceed Rs.1100 crores in export. Favourable trends in world market for leather products combined with timely display of dynamism and initiative by the industry at home has enabled to produce excellent export performance. The industry is poised now to scale greater heights in export performance.

The leather industry is witnessing a good deal of modernisation, diversification, expansion and technological upgradation too. The composition of Indian export has changed, leading to reduction in export of leather and substantial growth in export of leather products. The role of the Council at a juncture like this extends beyond mere export promotion. It encompasses activities like promoting modernisation, quality upgradation, technological upgradation and image creation abroad.

With active cooperation of its members and constant guidances from the Ministry of Commerce, Government of India, the Council seeks to fulfil its role. The main activities of the Council are:

- * Strengthening the domestic production base by encouraging modernisation and more investment in the industry.
- * Upgrading technology by obtaining and providing services of technical experts from abroad;
- * Improving training facilities within the country by interacting with various Government agencies and international agencies.
- * Improving the technical manpower base in the country by deputing technical personnel abroad for training in well known technical institutes.
- * Interacting with the trade and industry frequently to identify bottlenecks in production and export and removing the same.
- * Aiding the Government in formulation of export-import policy and export strategy.

The main task of the Council towards export promotion is sought to be achieved by:

Regular participation in well known fairs in different parts of the world particularly in important countries of Western Europe, U.S.A. and Japan.

Selective publicity of Indian products abroad through well known trade journals, direct mailing etc.,

Providing information to buyers abroad regarding Indian exporters of leather and leather products.

Collection and publication of market intelligence for exporters in India.

Publication of a special periodical journal on Indian leather products for importers abroad.

Organising Buyer-Seller-Meets in selected countries.

The Council's Head Office is located at Madras and its Regional Offices are at Bombay, Calcutta, Kanpur and Delhi.

STRATEGY TO BOOST EXPORTS

Speaking at the function, Mr. Arunachalam suggested that a six point clear cut marketing strategy be evolved to boost the export of value added leather and leather products. The strategy according to him was essential in view of the shift in the pattern of the global leather trade from West to South Asia which, according to the CLE Chairman, Mr. M.M. Hashim, was "very irreversible".

Mr. Arunachalam expressed happiness that the share of export of value added items is expected to be around 60% during the current year against 39% in 1984-85 and attributed it to the consistent policy support provided by the Government to the industry.

He acknowledged that the raw material availability could become a problem and if India wanted to tap the potential offered by the world market, its export strategy should be based increasingly on imported raw material. The existing production should be modernised and there is need for investment for not only modernisation but also for expansion and technological upgradation.

Stressing the need for higher productivity, the minister said when production was based on imported raw material, the wages were bound to rise and unless there was increase in productivity to take care of the changes

in wage levels, India may be left behind in the race for a bigger share of the world market.

The Minister said marketing support should be fully backed by the Commerce Ministry, a point earlier made by Mr. R. Dayal, Joint Secretary, Commerce Ministry. Mr. Dayal added that the CLE should also consider productivity awards to artisans who had helped achieve increases in the export of value added products.

PRESIDENTIAL ADDRESS

In his Presidential address Shri M.M. Hashim, Chairman Council for Leather Exports said:

"At the outset, I congratulate the winners of awards for the year 1986-87 for the excellent performance shown by them. Being a manufacturer and exporter myself I can well imagine the tremendous efforts put in by them in achieving the results that they have been able to achieve. No doubt the Government of India has been particularly helpful to the leather industry, having realised its enormous export potential. In general there has been considerable liberalisation in the economy over the past few years. The leather industry has definitely taken advantage of the situation and proved worthy of the trust placed on it by the Government. Having achieved a certain degree of success it is time that we gear up for much greater targets.

"The global import of leather and leather products, which stood at 21 billion dollars in 1985 is likely to jump up to 32 billion dollars by the year 1989-90. The shift in the world trade in leather and leather products which occurred in the late seventies and early eighties, seems to have become irreversible. The decline of the leather industry in advanced countries would appear to continue despite efforts being made towards introduction of automation. It is believed that in the years to come the developing countries will be the major suppliers of leather and leather products to the world market and of course the developed countries would be the major consumers. Whereas I expect the U.S.A., European Economic Community, Scandinavia, E.F.T.A. Countries, Canada, Australia and Japan to be the major consumers of leather and leather products in the coming years, the major suppliers are likely to be Brazil, Argentina, Spain, Portugal, Greece, Turkey, India, Pakistan, China, South Korea, Taiwan and Hong Kong. The question is often raised about the likely rise in consumption of leather products in developing countries. It may be there but at the way prices of leather products are going up, I fear it may continue to be beyond the reach of many in such countries. In this configuration of global market it will be

seen that India will have to face very tough competition from the countries almost similarly placed with regard to wage levels but with better productivity. It is therefore absolutely essential that we start modernising the industry at much greater speed and with much more purposefulness. Any delay can cost us dearly.

"In a situation like this it is necessary for us to examine what our strengths and weaknesses are. Among the strengths of India are the raw material base which is roughly 12%, global of availability of raw materials, our skilled work force and the helpful attitude of the Government towards the industry. Our weaknesses at present are inadequacy of trained technical manpower, absence of supporting infrastructural facilities for making machines, components etc., and deficiencies in design and product development capabilities. Though we are at present overcoming our weaknesses by resorting to imports, as the industry grows bigger and bigger we should definitely aim to generate these facilities within the country.

"Another important aspect to which I would advert is that the raw material available within the country can sustain our export upto a maximum level of Rs.2000 crores. Though all efforts must be made towards augmenting availability of raw material within the country by improving pre-tanning practices, avoiding wastages and by upgrading low grade leathers by suitable techniques there is no escape from our depending on more and more imports for augmenting exports. This has also to be viewed in the context of the fact that the developing countries where the leather industry is declining also happen to be major meat consumers and producers of hides and skins.

"The raw material produced by them is increasingly exported by them and the South East Asian countries and China are the major importers of these raw materials. India will also have to join the fray, if we have to proceed ahead.

"A time has come when we must set clear goals for the industry. We must decide what we want to achieve by the year 1990, 1995 and 2000 A.D. and how we want to achieve the targets, given our strengths and weaknesses. It would be ideal if a specific long term plan for the industry is chalked out by a group of representatives from the Government, the leaders of the industry and research institutions, financial institutions and planners in the country and a clear-cut strategy is evolved. Raising export from India from its present level of 1 billion U.S. dollars (expected in 1987-88) to about 5 billion U.S. dollars by the year 2000 A.D. would not appear to be

a very serious problem provided the industry and the Government decide upon this target and work in unison towards reaching that goal.

"You will all be glad to hear that the export from the leather industry during the first 8 months of this year has touched Rs.734.80 crores, as against Rs.548.67 crores during the corresponding period of last year, registering an increase of 34%. What is note-worthy is that the highest increase of 93% has been registered by the leather garment sector followed by 89% by leather footwear sector. These are the two sectors which are bound to register significant increases in the years to come as these two products together account for more than 60% of the global import.

"I am quite confident that the future for the leather industry in the country is quite bright and challenging. I am also equally confident that the industry today has the necessary dynamism, initiative and commitment to achieve greater heights. It goes without saying that behind the success of this industry is the contribution being made by each one of the exporters, financial institutions, Government, the research bodies and various agencies connected with the industry. The presence of the Honourable Union Minister of State for Industrial Development amongst us today gives us great strength and we rely on his continued support for future growth.

"I will be failing in my duty if I do not record my personal approbation as also the appreciation of the industry from all over the country for the tremendous contribution made by Shri R.Dayal, Joint Secretary Ministry of Commerce to the recent developments in the leather industry. I also expect to have his continued guidance and support.

"I once again congratulate all the winners of awards for their excellent performance and wish them greater success in the years to come. I also wish each one of you continued success in your endeavours."

DISTRIBUTION OF AWARDS

Awards for best export performance were conferred in the categories of overall exports, leather footwear, footwear components, leather garments, leather goods, industrial leather manufacturers, harness and saddlery articles, finished leather from hides and finished leather from skins.

The list of award winners in each category is shown in the table appearing on pp XXV and XXVI.

DISTRIBUTION OF AWARDS

Category & Description of Awards	Name of the Party	Year 86-87 Exports Rs. millions
OVERALL EXPORTS		
Plaque for best export performance	M/s. Tata Exports Ltd.	367.88
Certificate of Merit	M/s. Kizar Hussain & Sons	263.34
LEATHER FOOTWEAR		
Export to General Currency Area above Rs. 5 million)		
Plaque for best export performance	M/s. Tejoomals	115.52
Special Plaque	M/s. Florind Shoes Ltd.	112.39
Certificate of Merit	M/s. Farida Classic Shoes P. Ltd.	69.57
Certificate of Merit	M/s. Shoes East Ltd.	43.67
FOOTWEAR COMPONENTS		
Export to General Currency Area above Rs. 10 million)		
Plaque for best export performance	M/s. Farida Shoes Pvt. Ltd.	108.05
Certificate of Merit	M/s. Tata Exports Ltd.	69.32
Certificate of Merit	M/s. Sarup Tanneries Pvt. Ltd.	53.09
(Export to Rupee Payment Area above Rs. 10 million)		
Plaque for best export performance	M/s. Aero Traders Pvt. Ltd.	189.03
Certificate of Merit	M/s. Ramnath Exports Pvt. Ltd.,	130.04
Certificate of Merit	M/s. Sovin Enterprises	101.85
Certificate of Merit	M/s. Wasan & Co.	101.75
LEATHER GARMENTS		
(Export to General Currency Area above Rs. 5 million)		
Plaque for best export performance	M/s. Namaste Leather Garments P. Ltd.	62.00
Special Plaque for best export performance	M/s. Banaras House Ltd.	63.00
Certificate of Merit	M/s. Southern Sulphates & Chem. P. Ltd.	47.80
Certificate of Merit	M/s. Tata Exports Ltd.	44.90
Certificate of Merit	M/s. Mideast Shipping Company (I) Ltd.	38.20
Certificate of Merit	M/s. Sapri Garments Pvt. Ltd.	31.77
Certificate of Merit	M/s. Supreme Overseas	28.98
(Export to General Currency Area below Rs. 5 million)		
Plaque for best performance	M/s. Aafaq Leathers	4.22
Certificate of Merit	M/s. Bharat Export Import Corp.	4.02
LEATHER GOODS		
(Export to General Currency Area above Rs. 2.5 million)		
Plaque for best performance	M/s. International Export Corporation	42.99
Certificate of Merit	M/s. Rishi Export.	42.18
Certificate of Merit	M/s. Ajanta Leather Fashions P. Ltd.	31.20
Certificate of Merit	M/s. Camac Leathers Pvt. Ltd.	26.21
Certificate of Merit	M/s. Trio Trend Pvt. Ltd.	19.23

Category & Description of Awards	Name of the Party	Year 86-87 exports Rs. millions
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(Export to General Currency Area below Rs. 2.5 million)

Certificate of Merit	M/s. Prachin International	2.34
Certificate of Merit	M/s. Shanti Plastics	2.20

INDUSTRIAL LEATHER MANUFACTURERS

(Export to General Currency Area above Rs. 2.5 million)

Plaque for best performance	M/s. Ramesh Kumar & Co. (P) Ltd.	22.06
Certificate of Merit	M/s. New Horizons Pvt. Ltd.	18.40
Certificate of Merit	M/s. Singhvi International	8.21
Certificate of Merit	M/s. Overseas Leather Goods Corpn.	5.82

HARNESS AND SADDLERY ARTICLES

(Export to General Currency Area above Rs. 2.5 million)

Plaque for best performance	M/s. Talat (International) Trading Co.	14.76
Certificate of Merit	M/s. Kings & Olympia Export Consortium	10.08
Certificate of Merit	Lex International	8.94
Certificate of Merit	Grand International	7.26

FINISHED LEATHER FROM HIDES

(Export to General Currency Area above Rs. 10 million)

Plaque for best performance	M/s. Khizar Hussain & Sons	263.34
Certificate of Merit	M/s. Khizaria Leathers	130.05
Certificate of Merit	M/s. Super Tannery (India) Ltd.	34.81

FINISHED LEATHER FROM SKINS

(Export to General Currency Area above Rs. 10 million)

Plaque for best performance	M/s. Tata Exports Ltd.	203.27
Certificate of Merit	M/s. Ramco Super Leathers Ltd.	91.90

(Export to Rupee Payment Area above Rs. 10 million)

Certificate of Merit	M/s. T. Abdul Wahid & Co.	74.90
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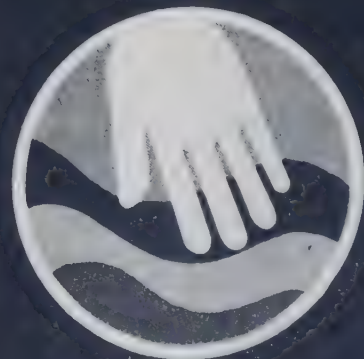
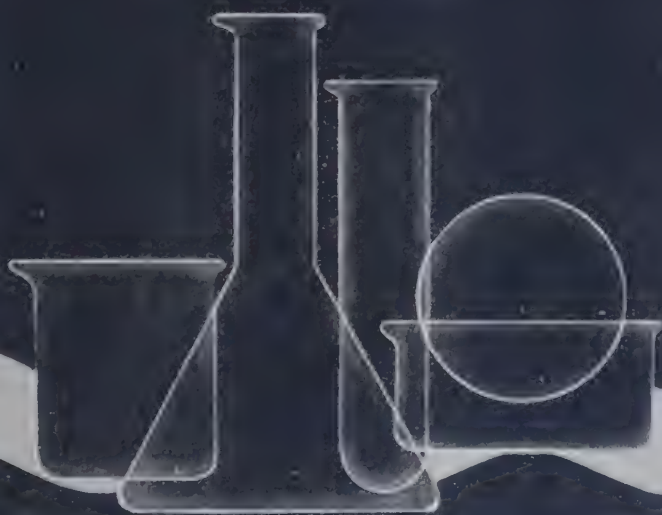
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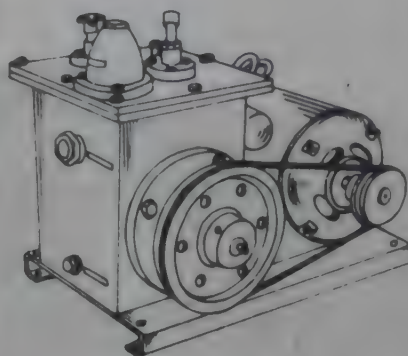
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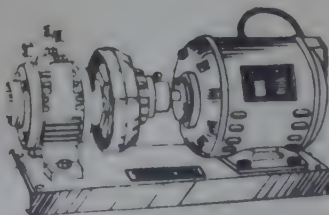
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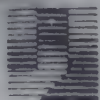
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LEATHER ABSTRACTS

ALTERNATIVES TO CHROMIUM TANNING -- PART I: THE STABILITY OF ALUMINIUM AND OTHER TANNAGES IN ACIDIC SOLUTIONS, K.C. Montgomery. *J. Soc. Leather Tech. Chem.*, 71, 187, 1987.

The weak link between collagen and aluminium and the loss of aluminium under acidic conditions may limit the use and acceptance of various solo and combination aluminium tannages. Multi-step processes incorporating more effective building sites than those naturally occurring in collagen have improved the stability of aluminium tanned products to acidic conditions. However, except for speciality leathers, the process may not be economically feasible at this time. Alternative dyeing techniques may be required if the less stable tannages are to be dyed. Chromium and Zirconium tannages are more stable than titanium or aluminium tannages under similar acidic conditions but titanium tannage may be of acceptable quality. Of the organic tannages, glutaraldehyde tannage is more stable than formaldehyde or hexamethylenetetrazine tannages.

WATER-BASED TANNAGE IN SOLVENT MEDIA, Wei Qing-Yuan. *J. Soc. Leather Tech. Chem.*, 71, 195, 1987.

This paper describes a new method using a water immiscible organic solvent such as 'light wax' to serve as the carrier in chrome tanning. The chrome powder dissolves in the water held in the pelts and penetrates quickly through the whole thickness of the pelts. The organic solvent carrier provides a cushioning action such that the pelts can be rotated smoothly and as freely as in aqueous media. After tanning the solvent gets separated readily on standing so that no chrome pollution

is discharged. The solvent can be used repeatedly, without any further treatment. The technique is economical and the quality of the finished leather is excellent.

THE CONTRIBUTION OF LIGAND SUBSTITUTION TO CHROME LIQUORS, G. Toth, *Das Leder*, 38, 153, 1987.

Partially neutralised carbonic acids increase or decrease the pH value of chrome solutions according to quantity and neutralisation. The increasing effect of ligand substitution is hidden by protolysis and ololation and it may proceed at high complex activity and at high marking. Because of the different reaction velocities of marking, of ololation, of protolysis and of ligand substitution the pH value of chrome solutions differs temporarily in different directions.

ADVANCES IN LEATHER FINISH TECHNOLOGY: THE AQUEOUS POLYURETHANES, D.H. Domajnko, *Leather*, 190, (4551) 19, 1988.

The unique class of synthetic polymers contributes to sound improvements in the physical properties of many leather finishes. Because of the versatility of polyurethane water-based systems, it is possible to make most types of finishes either classical or special effect types. Within the past decade, aqueous polyurethane resins have proved to be most beneficial in upgrading low-grade full grain leather crust and thus contribute to the production of a potentially more saleable leather. Although the aqueous polyurethanes have already contributed significantly to better and easier finishing, further revolutionary improvements are possible.

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Stahl has developed an important new material, the appearance and performance of which is remarkably close to that of leather. It has been developed using advanced water based technology and is suitable for sports shoes, shoe linings, shoe uppers, upholstery, car interiors and clothing.

— *Footwear Digest*, Nov./Dec. 1987.

MEN'S CASUALS

A new line of true-moc men's casual shoes has been introduced by consolidated Footwear, Montreal. These shoes are constructed of soft glove-leather uppers and padded ankles and are priced to retail around \$ 45.

— *Canadian Footwear Journal*, August, 1987.

ANTI-STAT COMPOUND

An antistatic PVC/alloy compound which eliminates electrostatic discharge has been developed by Bata and will soon be available. The new patented plastic alloy, D/S 6000, is a true antistatic composition with enduring antistatic properties. It is also resistant to dust, oil and climatic changes. Already in the footwear area, soles with antistatic properties are a pre-requisite for some safety shoes.

— *Shoe and Leather News*, 3730, 1987.

NEW BIOCIDES

Three new Biocides all based on the highly effective molecule (thiocyano methyl thio) benzothiazole

(TCMTB) were introduced by the Biocides Division of Albright and Wilson's Resins and Organics Group.

1. Tolcide C80 is 80% active for formulatory use. 2. Tolcide C30 is a preservative for use in leather, paper and timber industries. 3. Tolcide FSM is a blend of TCMTB and MBT (methylene bis thiocyanate). Its uses include the protection of leather, surface coatings, water based emulsions and timber.

— *Leather*, 190, 1988.

LIPAMIN — A NEW FAT LIQUOR

Lipamin liquor NSP, introduced by BASF is a cationically emulsified mixture of synthetic and natural fatty substances with a fat content of 65%. The product is used for top fatliquoring or proportionally in combination with anionic fatliquors to produce a strong surface effect or a barrier coat against migration for leathers which have a finish with pull-up effect.

— *Leather*, 189 (4550) 1987.

GLAZING FINISHING SYSTEMS

Stahl Chemicals have developed a new range of glazing finishing systems for use on men's and some ladies' shoe uppers. The finishes are based on EX 10332 glazing oil which is applied to the leather before the normal finishing binder. This results in an excellent gloss appearance. The oil is sprayed on to the leather and left for four to five hours before adding protein season coats. The finish is finally fixed with formaldehyde and glazed.

— *Leather*, 189 (4550), 1987.

INDIAN LEATHER SCENE

CLRI REVAMPS R & D ACTIVITIES

The Central Leather Research Institute (CLRI) has reoriented its research and development approaches to suit the modernisation needs of the country's leather industry. It has also drawn up a number of action plans so as to enable the industry to achieve the ambitious production and export targets set for the years to come.

Talking to newsmen in Madras, Dr. K.V. Raghavan, senior scientist, said CLRI has proposed a Rs.13 crore project to re-equip itself to undertake sophisticated research activities in hi-tech areas for modernisation of the country's leather industry. The World Bank and other financial institutions in the country have been approached for funding of the programme, to be spread over a period of two to three years. The Council for Scientific and Industrial Research (CSIR) will also participate in the plan.

Explaining some of the new initiatives taken by CLRI, Dr. Raghavan said objective assessment of leather quality is one aspect in which the institute has been doing extensive investigation. At present, the assessment techniques are subjective in nature based on visual inspection. The research centres around the possibility of using X-ray, electron microscopy and ultrasonic techniques for quality assessment and matching.

Another area where CLRI has been concentrating is development of a saltless preservation technique based on chilling of hides and skins. Preservation methods using salt and chemical additive combination are also being examined to reduce salt pollution load in soak liquors.

New technologies for beam house operations are also on the agenda of CLRI research activities. These pertain to modified soaking operations with less water consumption and new pollution-free unhairing techniques. CLRI has collaborated with Anna University, Madras to develop new enzymes which can withstand higher temperatures. One of the enzymes has undergone successful laboratory tests.

CLRI has achieved a breakthrough in developing synthetic tanning agents based on aluminium and aluminium-chromium combinations. Recovery and recycle of the agents is also being attempted in collaboration with the Regional Research Laboratory, Hyderabad.

New concepts for post-tanning operations have also been tried in the laboratory of the institute. Besides, it has set up a pilot-scale solar drying unit for leathers. Preliminary investigations are on to study the drying characteristics of Indian leathers using microwave energy.

Another major achievement of CLRI is in the medical field—the development of a technology for producing collagen tubes from animal intestines. Collagen tubes are used as temporary biological cover on open skin surfaces of all descriptions such as burns, traumatic wounds with skin loss, donor sites, stasis ulcers, etc.

The proposals for 1988-90 include establishing sophisticated instruments and equipment, computer-aided design facility for garments, computer-aided colour matching laboratory for leather dyeing, ultrasonic and improved version of scanning electron microscopic facilities etc. These apart, the chemical auxiliaries plant will be strengthened. Laboratory facilities will also be created for developing a wide spectrum of polyurethane based process technologies for adhesives, leather finishing and tanning.

CLRI has commenced a nation-wide survey on the capacity utilisation in tanneries. The reasons for non-utilisation of installed capacities and scope for modernisation and diversification will be specially examined during the survey. Last year, CLRI had done a survey on raw material availability in the country. The report with a set of recommendations has since been submitted to the Commerce Ministry.

CLRI is also participating in safety and risk studies of Madras Refinery expansion projects and the Hazira gas processing complex of ONGC. The studies executed under a collaboration arrangement between the Netherlands Organisation of Applied Research and CSIR. In addition, the institute has established a cell for Industrial safety and Risk Analysis to look into the Safety problems of chemical and allied industries.

LEVY ON EXPORTS: INDUSTRY OPPOSES CLRI PROPOSAL

The Indian leather products industry has ranged itself against the Central Leather Research Institute (CLRI)'s recommendation for a levy between one and three per cent on exports of leather products. Mr. S.S. Sawhney, the President of Indian Leather Products Association (ILPA), said that if operational, the levy on leather products would defeat the Government's objective of fetching of Rs.1500 crores by 1990 through leather exports.

The State-run CLRI had proposed that the proceeds from the levy be used to set up a national fund for the development of leather resources.

As the products industry viewed it, the idea of a national fund was welcome in principle as it would ensure increased availability of hides and skins to the domestic industry. But there was little justification in having the fund built up by taking leather

products exports. Mr. Sawhney said the proposed levy would clash with the industry's target of realising a 90% share of the total exports from the leather sector by 1990.

Although the Government had put into operation a number of incentives in recent months, the industry, he said, still required certain relaxation in import norms in the interest of export performance. Any additional tax burden at this point of time would hit the industry, he added.

Welcoming the national fund concept, Mr. Sawhney said funds to the extent of Rs.25 crores plus could be mopped up by canalisation of resources available with the State Leather Development Corporations. Besides, the Leather Development Fund of the State Trading Corporation could also be tapped for the purpose. In case of a deficit in such finances, he said a levy ranging between one and three percent could be operated on the exports of finished and semi-finished leather.

TECHNOLOGY INTRODUCTION: LEATHER PRODUCTS MORE COMPETITIVE

Efforts to induct the latest technology in the leather industry so as to make the products competitive in the international market have paid rich dividends. According to Mr. A. Sahasranaman, Executive Director, Council for Leather Exports (CLE), those manufacturers, who have ventured to invest in machines, technology and better quality raw material, have been able to get a higher price in the export market. CLE has now embarked on a mission to increase the number of such manufacturers.

Addressing a seminar on 'Export opportunities in overseas market', organised by CLE in Madras, he noted that India has the potential to become a world leader in leather and leather products despite the present weaknesses. Mr Sahasranaman

drew on his rich experience as leader of many an export promotion delegation that visited countries like West Germany, the U.S., Italy and France, to drive home his point.

He pointed out that the greatest strengths of Indian leather industry are cheap wages and a skilled labour. Though domestic raw material base was thin, there is enormous scope for augmenting the exports from imported raw material.

In any case, to become a world leader, the present approach to the industry's problems and requirements, should necessarily change. In this context, the CLE Executive Director said the need to seriously consider whether this industry should be totally dereserved and thrown open for investment by professionally managed companies in a large way, without restrictions.

Mr. M.M. Hashim, Chairman CLE, cautioned entrepreneurs against entering the industry without a clear idea about product-mix and the areas they will be involved. New-comers are, of course, welcome, but they would do well to have a dialogue with the council officials first to get advice on selection of product-mix and the prospective areas.

He said CLE was now concentrating on improving the image of India abroad. As part of this campaign, an 'India Week' proposed to be organised in West Germany in September this year, in association with the State Bank of India.

Mr. S. Subrahmanyan, Deputy Director-General, Bureau of Indian Standards, who inaugurated the seminar, said India has the advantage of competing with only developing countries in the export market. But this posed a challenge too.

He cited innovation, improvement and image-building as three important aspects that needed to be focussed on in export promotional effort.

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LEATHER NEWS FROM ABROAD

JUSTABLE IN-SOLES

After many years of research, a Montreal entrepreneur is marketing Shoe/Adapter an adjustable insole for women's shoes which purports to solve many fitting and comfort problems. The shoe/Adapter consists of a pair of insoles with various add-on or removable parts. The insole has removable inian guards, sponge rubber metatarsal pads, for-foot sponge rubber cushioning, arch supports and other features which can be arranged for optimum fit and comfort by the wearer. (*Canadian Footwear Journal*, August 1987).

LEATHER PRICES UP

According to the Shoe Manufacturers' Association of Canada, current asking prices for hides and shoes are at their highest levels since 1979. The price rise is attributable to increased demand for North and South American hides from countries in the orient coupled with a weakened consumer demand for red meat and herd building programmes. Leather prices are up approximately 33% since the beginning of 1987 and as much as 40% from a year ago, putting pressure on finished shoe prices. (*Canadian Footwear Journal*, August 1987).

WALKING SHOES

A 'walking shoe' is a shoe which is designed and engineered to be comfortable and biochemically correct for the walking gait. 17 key characteristics have been identified in the building of a marketable, bio-mechanically correct 'walking shoe'. They are weight shock absorption, heel; shock absorption, fore foot; torsional stability of bottom; Forefoot flexibility; Location of dorsiflexion crease; rocker sole; Ball girth; toe room; heel support; arch support; heel height; upper padding in critical fit areas; Breathability/ventilation of upper; traction of sole; durability/quality of upper and bottom components; and, reparability (sole replacement). (*American Shoe Making*, 361, (81) 1987).

HOT FOOT

A new insole for boots and shoes marketed under the name Hot Foot is designed to aid blood circulation and to increase skin temperature. The technique involves magnetised fertile strips built into a foam and aluminium foil sandwich, a process which has been patented by the makers. Several hundred individuals have tested Hot Foot in different situation and comments from them have been most encouraging. A number of people suffering from permanent cold feet have noticed a great improvement when wearing Hot Foot insoles throughout the day, indoors and out. (*Shoe and Leather News* (3733), 1987).

PLEATHER

A technique developed by the Jerusalem College of Technology transforms scrap leather into a rigid versatile thermoplastic material which has been termed 'pleather'. It is said to have attributes of both plastic and leather, with applications including shoes. Patents are pending in the USA, Canada, Europe and Israel. Among the benefits claimed for pleather is that conventional press forming techniques used in the plastic industry can be employed. (*Shoe and Leather News*, 3734, 1987).

NEW TEST METHOD FOR COATING

The British Standards Institution has published a method of determining the thickness of the surface coating applied to leather of all types measured under zero compression. Definitions that can now be fully implemented are 'Coated Leather', 'Laminated Leather' and 'Leather'. The method is published as BS 3144 Part 28 "method for measurement of thickness of surface coatings on leather" and is obtainable from BSI sales at Linford Wood, Milton Keynes MK14 6 LE. (*Shoe and Leather News*, 3727, 1987).

OSTRICH FARM IN US

Among imports blocked by the tightening of sanctions imposed on South Africa were the bulk of the 60,000 ostrich hides which US manufacturers each year turn into wallets, purses and cowboy boots. Rather than go without the distinctive leather, American farmers now plan to grow their own. Ostriches take only a couple of years to reach maturity and can lay upto 50 eggs in a season. (*Shoe and Leather News*, 3727, 1987).

CAD IN FOOTWEAR INDUSTRY

In 1986, there were 80 known users of footwear CAD systems in the world. In September 1987, it was reported at a conference in Spain, that 157 companies in 20 countries had invested in CAD systems and the number of actual work stations in use was probably around 350. In just 12 months, the number of footwear companies investing in CAD has doubled. (*Shoe and Leather News*, 3729, 1987).

AUTOMOTUR PIG LEATHER

In a major breakthrough, Wolvaine Leather, USA, is now supplying automotur pig leather for some Japanese car models manufactured by Nissan. Pig leather is expected to be used in thousands of cars produced by Nissan, starting with the 1988 models. (*Leather*, 189, (4550), 1987).

WORLD PRODUCTION OF HIDES AND SKIN

According to the Foreign Agricultural Service of USDA, production of hides and skins in the major producing countries continued its modest upward trend in 1986. It is projected to level off at about 4.5 m. tons in 1987 followed by a slight decline in 1988. The Soviet Union with 1.1 m. tons may overtake US as the world's largest producer in 1987. The US, the Soviet Union and the EEC produce nearly two-thirds of the world's supply of hides and skins with Argentina, Brazil, Mexico and Australia contributing another 20%. (*Leather*, 189, (4550) 1987).

INSOLE WITH COPPER LINING

The Ranch Company, Hinterweidenthal, Germany has developed the 'copper insole', an insole material lined with copper foil for therapeutic applications. It is known in some medical circles that copper counteracts cramps, in the present case foot cramp. (*Schuh+Technik+abc. via Footwear Digest*, Nov./Dec. 1987).

CHICKENS' FEET FOR SHOE

In Taiwan, the chickens' feet are opened lengthwise, tanned and finished either matt or shiny. They are sewn together in footwear factories and then stuck to pieces of leather, usually pig, and used as decorations for footwear.

THERMOPLASTIC NATURAL RUBBER (TPNR)

Blends of natural rubber with polyolefines mainly polypropylene will soon go into production, and are expected to find use in footwear and sports goods and in automotive parts. The material has been developed at the Tun Abdul Razak Laboratories of the Malaysian Rubber Research and Development Board and is not yet commercially available. (*Footwear Digest*, Nov./Dec. 1987).

LEATHER FOR ROYAL SHOES

In 1786 the Danish brigantine Die Fraumetta Catharina Von Flensburg bound for Geneva with a cargo of hemp and leather sought shelter in Plymouth during a storm. The Russian leather lay in the mud under the sea undisturbed for nearly 200 years. The leathers are being used now to make exclusive shoes for royalty and other distinguished clientele.

It has been confirmed that the leather is almost certainly reindeer treated by the traditional method of tanning with willow bark and curried with birch oil. To prepare the leather for use again, it is necessary to give it prolonged washing in freshwater for removing salt and redress it with saddle soap or lanolin. The leather retains its rich musky odour and characteristic varieties in colour. (*Leather*, 189, (4548), 1987).

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EXPORT INQUIRIES SOLICITED.

Chloride India may enter metals, plastics

The name of Chloride India Limited is to change to Chloride Industries Limited. This was indicated by Mr. S. K. Birla, the new chairman of the company, recently. The change of name is being contemplated in view of the company's plan to diversify into non-battery related manufacturing activities. Mr. Birla was addressing shareholders at the company's annual general meeting.

Later, talking to newsmen, Mr. Birla said the possible areas of diversification could be metals and plastics. Internationally, Chloride is in three major areas of business namely, electronics, electricals and energy. Therefore, the scope for diversification in India remains large.

Mr. Kent Price, chief executive, Chloride Group, PLC, UK, who was present at the AGM as also the press conference, made it clear that the Chloride Group,

through its Singapore-based subsidiary Chloride Eastern Limited, would continue to hold the majority 50.7 per cent stake in the Indian company.

Chloride Group, PLC, UK, which now owns the entire equity capital of Chloride Eastern Limited will in two phases bring down its investment to 50.01 per cent. The UK company is now in the process of marketing by way of private placement 24 per cent holding in Chloride Eastern through Citicorp and Merrill Lynch. The associates of Mr. Birla and Mr. P. K. Jani, a UK-based NRI, will between them subscribe to 20 per cent of the issue which is to close in the first week of March. The issue, according to Mr. Birla, is getting favourable response in places like London, Singapore, Hong Kong and Dubai.

At a subsequent stage, the UK

company will make a public issue equivalent to 25 per cent of its holding in Chloride Eastern. The issue, said Mr. Price, would take place when the stock market turned favourable. In reply to a question, he said the Chloride Group was getting the kind of price for the private placement that it was looking for. Mr. Birla said that his associates were not likely to make application for shares when the public issue was made.

Allocations for Chloride India's R&D activities would be stepped up and the company's R&D centre in Calcutta would be entrusted with greater responsibility for the entire group, Mr. Price said, adding that the thrust of R&D in Calcutta would be in batteries for use in tropical climates. Mr. Birla added that the constant endeavour would be to keep Chloride plants in India technologically up to date.

Mr. Price observed that "while Chloride India has always been a very profit-making company, it has never been an important source of products for the group". Chloride International which procures over 60,000 two-wheeler batteries a month from South Korea has decided to source the product from the Pune plant of Chloride India which is to step up its capacity to 360,000 units from the present 250,000 units, Mr. Birla said. Export of two-wheeler batteries through the Chloride International route should start within eight months.

The performance of Chloride India in the first five months of the current year (September, 1987 to January 1988) had been encouraging, sales having increased by about 25 per cent over the corresponding period of the previous year. The increase in sales had been mostly due to higher prices of batteries resulting from the continuing inflation in lead prices.



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MARKET INFORMATION

Caustic, Soda Ash Improve

The availability of caustic soda and soda ash improved in the Bombay's Chemical Market 'Vadgadi' owing to better supply position. The rates show a slight downward trend. Titanium oxide rutile grade shot up to Rs. 70. Naphthalene crude was experiencing

some shortage. Citric acid continued to be in good seasonal demand.

It was reported last week that Atul Products had revised upwards the rates of some of its dye intermediates. However certain intermediates prices declined slightly this week. Tobias

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acid which was ruling at Rs. 108 per kg, suddenly shot up to Rs. 115.

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Ammonium nitrate	4.00
Arsenic white powder	21.00
Acrylamide (Resale)	58.00
Barium carbonate	6.00
Bleaching powder (33% Cl)	3.75
Borax (Granular)	15.00
Borax (Powder)	15.50

Boric acid (Tech.)	21.00
Bisphenol-A	46+ST
Butyl carbitol	35.00
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Caustic soda (Solid)	7.75
Caustic soda (Lye)	6.00
Calcium chloride 70% (solid)	3.25
Calcium chloride 75-80% (fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium Carbonate PPT	3.00
Calcium carbonate (Activated)	3.55
Camphor (Indian)	80.00
Cresylic acid	50.00

Cream of Tartar (Tech.)	64.00
Citric acid (Belgium) (Resale)	46.00
Citric acid (Indian) (Resale)	45.00
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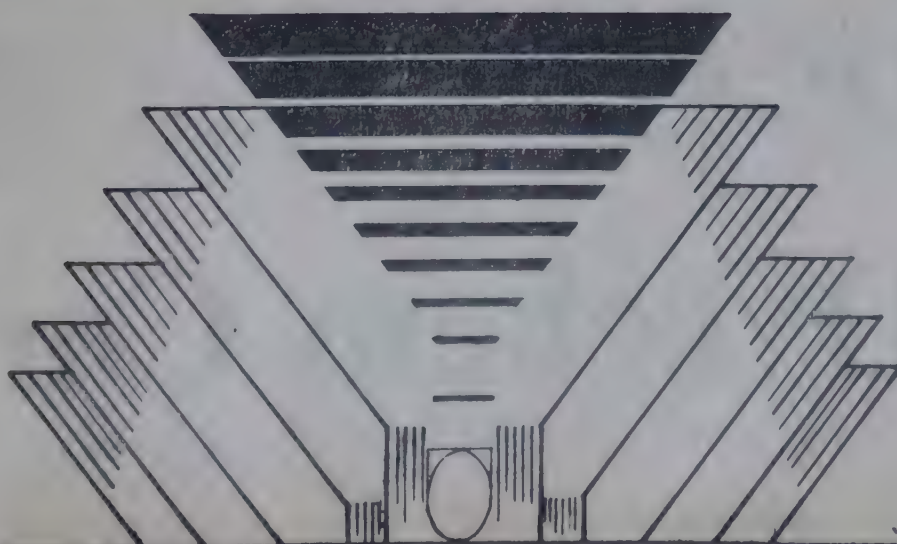
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Hydro	31+ST	Sodium chlorite 50% (Spain)	81.00	Carbon Tetrachloride	12.00
Hyflosupercell	18.50+ST	Santobrite (Indian)	36.00	Cellosolve	42.00
Hexamine	29.00	Soda Ash (Tata)	3.90	Cyclohexanone	52.00
Industrial Wax	25.00	Soda Ash (Birla)	3.75	Cyclohexanol	43.00
Litharge	15.00	Soda Ash (Imp.)	3.50	Diacetone	34.00
Lead Acetate (Tech.)	28.00	Sodium bicarbonate	5.25	Diethyl Oxalate	34.00
Lithopone	15+ST	Sodium bisulphite	4.50	Diethylene glycol (DEG)	33+ST
Magnesium chloride (crystal)	2.00	Sodium silicate	3.00	Diethyl Phthalate	52.00
Menthol crystal (Flakes)	185+Ex.+ST	Sodium acetate	5.90	Diallyl Phthalate	56.00
Menthol bold	205+Ex.+ST	Sodium alginate	220+ST	Dimethyl Phthalate	28.00
Menthol crystal bold	245+Ex.+ST	Titanium Dioxide (Anatase)	53+ST	Diethyl Adipate	52.00
Magnesium carbonate (Japan)	16.00	Titanium Dioxide		Dibutyl Adipate	42.00
Magnesium carbonate (Indian)	15.00	(Rutile — RCR ₂)	70+ST	Dipentene	15.00
Maleic Anhydride (per kg)	35.00	Tartaric acid (Crystal)	84.00	Dimethylamine 40%	12.00
Mercury (75 lbs.)	9,000.00	Trisodium phosphate	4.80	Dimethylamine 60%	14.00
Nickel chloride	60.00	Thiourea	70+ST	Ethyl Acetate	23.85
Oxalic acid	19.00	Urea (Tech)	2.75	Ethyl Acrylate	46.00
Peppermint oil (Rectified)	90+Ex.+ST	Vacuum salt	1.00	Ethylene Dichloride	11.00
Potassium carbonate (Indian)	19.00	Zinc Dust	30.00	Ethylene Glycol	23.25
Potassium carbonate (Imported)	21.00	Zinc Oxide	30.00	Formic Acid (Imp.)	31+ST
Potassium bichromate	22.00	Zinc chloride powder		Formaldehyde	5.00
Potassium phosphate (Mono)	14.00	(technical)	14.00	Glycerine (CP)	49.00
Potassium phosphate (Di)	14.00	Zinc sulphate	3.90	Glycerine (IW)	45.00
Polyvinyl alcohol (No. 117)	88.00			Hydrogen peroxide 50%	
Polyvinyl alcohol (No. 173)		SOLVENTS	Per kg	(Resale)	30.00
(Resale)	96.00	Acetic Acid (Glacial)	13.50	Isopropyl Alcohol	17.50
Polyvinyl alcohol (No. 208)	95.00	Acetic Anhydride (Resale)	24.00	Iso Butyl Alcohol	28.00
Paraformaldehyde	18+ST	Acetone (Resale)	17.00	Monoethanolamine	46.50
Phthalic anhydride 96%	23.25	Adipic Acid	50.00	Melamine	43+ST
Pentaerythritol (Resale)	52.00	Aceto Acetanilide	50.00	Morpholine (Indian)	65.00
Paraffin wax	13.50	Aniline Oil	44.00	Methyl Ethyl Ketone	36.00
Rangolite (German)	70.00	Benzoate Plasticiser	33.00	Methyl Isobutyl Ketone	36.00
Rangolite (Czech.)	46.00	Butyl Acetate	39.00	Methyl Acrylate	42.00
Sodium sulphate (Fine)	4.00	Butyl stearate	16.00	Methylene Dichloride	24.00
Sodium sulphate (Coarse)	3.80	Butyl acrylate	75+ST	Meta Cresol	45.00
Sodium sulphide 50-52%		Butanol (Resale)	35.00	Nitrobenzene	17.00
(Flakes)	8.00	Benzyl chloride	24.00	Nitric Acid (Con.) (RCF)	2.50
Sodium sulphide 58-60%		Benzo trichloride	16.00	Ortho Cresol	32.00
(Flakes)	9.00	Benzoyl chloride	22.00	Phenol	31.00
Sodium sulphide pure (Flakes)	12.25	Benzyl alcohol (FPC)	36.00	Propylene Glycol	30.00
Sodium nitrite	13.25	Bromine Liquid	42.50	Polyethylene Glycol (No. 200)	40.00
Sodium chlorite 80% (Spain)	90.00	Chloroform	26.00	Polyethylene Glycol (No. 400)	37.00
				Polyethylene Glycol (No. 500)	42.00

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Sorbitol	16.50
Trichloroethylene	27.00
Triethanolamine	50.00
Sulphuric Acid	2.10
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	11.75
Triethylamine	50.00
Vinyl Acetate Monomer	40.50

SOLVENTS	Per Litre
Benzene	8.80
N-Heptane	8.00
N-Hexane	8.75
Methanol	6.75
Solvent Naphtha Heavy	9.50
Solvent Naphtha Light	8.50
Toluene	9.25
Xylene	14.00

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Alphanaphthylamine	60.00
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Anthranilic Acid	61.00	N-Methyl J. Acid	400.00
2-Amino-4-Nitrophenol (Imp.)	140.00	N-Methyl Aniline	135.00
Blue B. Base (Local)	235.00	Naphthalene crude	20.00
Beta Naphthol (Atul)	55.00	Naphthalene (Refined)	23.00
Benzidine Dihydrochloride (BDH)	72.00	Ortho Anisidine (OA Imp.)	84.00
Bromamine Acid	375.00	Ortho Dichloro Benzene (ODCB)	10.50
BON Acid	110.00	OT Base	93.00
Chicago Acid	280.00	Para Dichloro Benzene (PDCB)	16.00
Coach Acid	53.00	Para Anisidine (PA-Imp.)	110.00
C. Acid (Imp.)	260.00	Para Anisidine (PA-Local)	87.00
Cyanuric Chloride (Japan)	118.00	PNA	66.00
2, 4, DNCB	26.00	Para Cresidine (Imp.)	325.00
Dihydrothio PTOS (Imp.)	500.00	Para Amino Azo Benzene (India)	125.00
Dimethyl Aniline	56.00	PNCB	27.50
Diethyl Aniline	142.00	Para Amino Acetanilide	140.00
Di-amino stilbene disulphonic acid	120.00	1-Phenyl 3-methyl-5 Pyrazolone	115.00
3, 3-DCB (Imp.)	165.00	Phenyl J. Acid	340.00
Gamma Acid (Atul)	165.00	Para Amino Benzoic Acid	170.00
H. Acid (Atul)	150.00	PT Base	88.00
G. Salt	56.00	Rhoduline Acid	505.00
Isophthalic Acid	39.00	Resist Salt	18.00
J. Acid	275.00	Resorcinol	140.00
J. Acid Urea	270.00	Sodium Naphthionate	62.00
K. Acid	95.00	5-Sulpho-Anthranilic Acid	60.00
MDPS (German)	210.00	Sulphanilic Acid	26.00
MNA	75.00	Sulpho Tobias Acid	100.00
Meta Urido Aniline	135.00	Trichloro Benzene (TCB)	15.00
MPD (Local)	130.00	Tobias Acid	115.00
MPD (Japan)	150.00		

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Bombay Dyes Market

(Prices as on 10th February, 1988)

ACID COLOUR	Per Kg
Acid Violet 4BS	143.00
Acid Maroon V	110.00
Acid Orange II	77.80
Acid Orange ILY	63.05
Acid Red A	107.25
Crosein Scarlet MOG	155.00
Acid Scarlet 3R	99.90
Acid Red 38N	135.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Green V	230.00
Acid Patent Blue AS	250.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	85.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	121.95
Acid Black BX	98.40
Acid Black Wax	135.50
Procinil Yellow GS	
(ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G	
(ICI, UK)	600.00
Procinil Orange G	
(ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00
DIRECT COLOURS	Per Kg.
Yellow 3GX	88.10
Gun Yellow RCH	124.00
Fast Yellow GCH	141.15
Yellow CFG Hly. Conc.	312.00
Fast Yellow GS	111.65
Fast Yellow CHRS	95.45
Viscose Orange A	166.15
Fast Orange GR	133.75
Red	96.90
Dark Tan	78.25
Red IIR	72.55
Red 4B	169.10
Bordeaux BW	132.30
Fast Scarlet 4BS	166.55
Red 12B	170.55
Bordeaux Hly Conc.	194.00
Cotton Red N	117.05
Brill. Fast Helio B	278.00
Brill. Fast Helio 2B	297.00
Brill. Fast Helio 2B	297.00
Brill. Fast Helio 2RS	136.20
Brill. Fast Helio BS	116.10

Brill. Violet Extra	126.40
Blue 2B	86.60
Blue G	170.50
Sky Blue FB	188.25
Copper Blue GR	147.00
Fast Greenish Blue GL	114.60
Developed Black BT	116.10
Blue NB-2B	300.20
Blue NB-2BC	185.30
Developed Black NB-GHB	185.30
Green B	111.65
Green NB-B	188.25
Green 2B-N	188.25
Brown MR	154.40
Brown CN	107.25
Golden Brown G	140.35
Catechin G	120.50
Omega Tan	126.40
Catechin GS	102.80
Black E Hly Conc.	142.60
Black E Extra Hly Conc	142.60
Black NB-ER Hly. Conc.	310.50

DISPERSOL COLOURS	Per Kg
Yellow 6G Powder	143.80
Red B 3B Powder	247.80
Red B 2B Powder	323.20
Red CB Powder	439.15
Red D2B Powder	477.40
Violet C 4R	521.90
Blue BG Powder	235.45
Blue BN Powder	103.75
Blue D 2R Powder	476.25
Navy BT Powder	243.90
Blue B 2G Powder	210.20
Black BT Powder	182.60
Blue BR Powder	390.20
Yellow 7GL	338.60
Yellow 5RX	218.80
Yellow 3G	367.25
Yellow	140.00
Yellow AL	135.30
Yellow Brown REL	247.50
Yellow FFL	463.60
Gold Yellow GG	259.70
Pink REL	247.00
Red REL	468.65
Red 2B	327.40
Red FB	324.20
Red Violet FBL	469.85
Orange 3R	196.65
Violet 3R	280.00
Violet RL	275.45
Violet 6R	485.75

Scarlet RR	214.85
Rubine 3B	223.05
Rubine CB	364.90
Blue GL	318.95
Blue BGF	636.55
Navy Blue RF	270.40
Brown 3REL	200.40
Black GEL	324.20
Dark Brown 3B	317.40

BASE COLOURS	Per Kg
Fast Yellow GC	80.20
Fast Orange GC	135.45
Fast Scarlet R	166.90
Fast Scarlet RC	126.65
Fast Scarlet RCR	99.05
Fast Scarlet G	121.65
Fast Scarlet GN	91.50
Fast Scarlet GG	72.70
Fast Scarlet GGS	72.75
Fast Red B	203.20
Fast Red RC	119.15
Fast Red R Flakes	149.25
Fast Red TR	166.80
Fast Red TR Oil	183.15
Fast Red RL	237.10
Fast Red KB Oil	201.90
Fast Bordeaux GP	201.95
Fast Garnet GBC	94.06
Fast Violet B	505.60
Fast Blue BB	521.45

NAPHTHOL COLOURS	Per Kg
ASG	217.00
AS	143.00
ASSW	279.75
ABBS	189.15
ASBO	195.65
ASD	175.50
ASOL	179.35
ASTR	279.75
ASPH	279.75
ASE	198.05
ASEI	184.40
ASLB	1632.60
ASBT	1817.00
ASWG	143.00
ASSG	397.70
ASSR	480.50

COLOURS	Per Kg.				
Golden Yellow HR	181.80	Navy Blue M 3R	310.95	Blue R Conc. Pdr. Fine	577.65
Brill. Yellow H4G	117.85	Brill. Blue MR	331.70	Blue RR Supra Powder	629.35
Supra Yellow H-8GP	168.55	Brill. Blue M RX	214.20	Blue Conc. Powder	645.80
Brill. Yellow HE6G	168.95	Brill. Blue M-G	382.30	Brill. Blue 2R Hly. Conc.	378.55
Yellow H-E4R	276.05	Blue M 4GD	344.60	Brill. Blue 2R Supra Disp.	115.65
Brill. Yellow H7G	332.30	Navy Blue M RB	318.75	Dark Blue 2R Powder Fine	389.25
Yellow M4R	243.95	Turquoise M-G	197.85	Blue BC Supra Disp.	359.40
Yellow M GR	326.05	Brill. Blue M GX	302.50	Jade Green XBN Powder Fine	438.20
Brill. Yellow M4G	177.10	Blue 3R Acra Powder	718.20	Jade Green XBN Acra	
Brill. Yellow M8G	332.30	Dark Brown H 6R	248.45	Conc. Powder	823.90
Yellow M 3R	217.60	Cobalt Oxide (per kg.)	285.00	Jade Green 2G Pdr. Fine	419.65
Brill. Orange H 2R	241.85	Green H 4BD	269.80	Jade Green 2G Ptg. Paste	125.40
Brill. Red H 7B	157.95	Green H-E4BI	169.80	Jade Green XBN Ptg. Paste	126.00
Brill. Orange M 2R	313.15	Red Brown H IF	143.25	Jade Green 2G Supra Disp.	496.00
Brill. Red H 8B	169.45	Orange Brown H 2B	209.05	Olive Green B Pdr. Fine	399.90
Brill. Scarlet H RN	245.05	Brown M GRN	188.50	Olive D Pdr. Fine	444.30
Supra Red H-3BP	179.30	Black H-N	283.35	Olive Green B Supra Disp.	308.25
Brill. Red H-F3B	243.45	SULFUR COLOURS	Per Kg.	Jade Green XBN Supra	
Brill. Magenta HB	167.00	Navy Blue	99.85	Disp. (N)	327.30
Brill. Red M 5B	98.90	Green G	198.55	Olive OMW Pdr. Fine	698.55
Brill. Red M 8B	173.70	Black Grains Extra	63.05	Olive OMW Supra Disp.	538.05
Brill. Pink MB	137.10	Black Grains OG	64.55	Olive R. Pdr. Fine	422.95
Brill. Magenta MB	121.55	Black GXE Conc.	81.60	Olive D Supra Disp.	361.70
Brill. Purple H-3R	180.20	Black GXE	52.75	Olive R Supra Disp.	363.90
Brill. Purple H-7R	175.40	Black GXR	61.60	Olive D. Ptg. Paste	193.00
Navy Blue H 3R	298.50	Black Grains 800	54.20	Olive Green B. Ptg. Paste	199.10
Brill. Blue H-GR	366.55	Black EXR Grains	64.55	Olive Green B Acra Conc.	542.75
Brill. Blue H 5G	173.10	Black EXR Grains 800	51.25	Olive R Acra Conc.	640.00
Blue H 5R	283.95	VAT COLOURS (ICI)	Per Kg	Olive Green B Acra Conc.	542.75
Brill. Blue H 7G	178.70	Yellow 5G Powder Fine	673.15	Brown R Pdr. Fine	835.00
Brill. Blue H 7RX	358.15	Yellow 5G Supra Disperse	439.30	Brown G. Pdr. Fine	795.00
Turquoise HA	234.45	Yellow 5G Acra Con.	628.75	Brown R Pdr. Fine	659.75
Supra Blue H-3RP	335.70	Yellow 3R Powder	588.85	Dark Brown 3R Pdr. Fine	685.00
Supra Turquoise H 2GF	181.50	Gold Orange 3G Pdr. Fine	952.15	Brown G. Supra Disp.	449.90
Blue H-ERD	305.80	Brill. Orange 6R Pdr. Fine	624.35	Brown 2G Supra Disp.	554.00
Navy Blue H ER	258.60	Gold Orange 3G Supra Disp.	601.30	Brown R Supra Disp.	422.95
Blue H 5RX	269.30	Brill. Orange 6RX Powder	394.30	Brown BR Powder	719.00
		Brill. Red 3B Pdr. Fine	997.80	Dark Brown 3R Ptg. Paste	217.15
		Brill. Red 3B Supra Disp.	713.20	Dark Brown 3R Supra Disp.	414.55
		Brill. Purple 4R Conc. Pdr.	470.75	Brown G Acra Conc.	733.95
		Brill. Purple 3R Acra Powder	690.85	Brown R Acra Conc.	766.00
		Brill. Purple 2R Hly Conc.	597.90	Grey M. Powder Fine	768.80
		Brill. Purple 4R Supra Disp.	500.05	Grey M. Supra Disp.	585.45
		Brill. Purple 2R Acra Conc.	625.95	Blue BC Acra Conc. Pdr. Fine	762.70
		Blue R Powder Fine	542.15	Direct Black AC Supra Disp.	330.35
		Blue BC Conc. Pdr. Fine	522.50	Direct Black AC Pdr. Fine	474.70
		Blue BC Acra Conc. Pdr. Fine	762.70	Direct Black CH Supra Disp.	393.20
				Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: FEB. 12 (NNS) — Camphor powder jumped up sharply by Rs. 5 at Rs. 92 per kg. in the local chemicals market during the last week, on account of tight supply by manufacturers, says NNS. Camphor thal was also quoted higher by Re. 1 at Rs. 96 per kg. owing to good offtake.

Mercury recorded a handsome gain of Rs. 100 at Rs. 9300 per flask on inadequate stock position in the local market as well as encouraging advices from Bombay. Soda bicarb marked up by Rs. 17/25 at Rs. 275/285 in the beginning of the week owing to acute shortage of stocks in the market but later due to increased arrivals of Tata goods its priced turned back by Rs. 5/15 and closed at Rs. 260/280 yet showing a gain of Rs. 2/10 per kg. over previous level.

Paraffin wax quoted higher by Rs. 10 at Rs. 615 owing to tight supply and good demand by consumers. Chatko-light also ruled static at Rs. 45 due to

shortage of goods. Sodium hydro sulphite ruled quiet at Rs. 32/36 owing to reduced demand by gur khandsari manufacturers.

Menthol medium and bold dropped by Rs. 10 each at Rs. 225 and Rs. 235 owing to nervous unloading by stockists caused by acute shortage of money. Menthol flake tumbled down by Rs. 13 at Rs. 215. Hydrogen peroxide softened slightly by Rs. 2 at Rs. 29/132 owing to improvement in supply.

Sodium nitrite declined by Rs. 25 at Rs. 700 per 50 kg. due to poor enquiries. Sodium nitrate also eased by Rs. 5 Titanium dioxide Anatase reacted downward by 50 paise at Rs. 52 on slack demand. Sodium sulphate cheaper by Rs. 2/5 per 50 kg. owing to increased supply.

Among direct dyes, Basic Auramine 'O' conc. and Rohdamine B. 500% jumped up by Rs. 10/20 at Rs. 55/110 and Rs. 220/320 per kg. respectively on good demand.

Copper Sulphate (per quintal)	1800-2100.00
Formic acid (per kg)	30-31.00
Formaldehyde (per kg)	6.50
Hydrogen Peroxide (per kg)	29-31.00
Calcium Carbonate (per tonne)	2500-4000.00
Acid Slurry Soft (per kg)	25.00
Acid Slurry Hard (per kg)	32.00
Phosphoric Acid (per 50 kg)	825.00
Pot. Nitrate (per quintal)	900-1200.00
Pot. Permanganate (per 50 kg)	2300.00
Sod. Bichromate (per 50 kg)	1025-1125.00
Tri-Sod. Phosphate (per 50 kg)	330-340.00
Titanium Dioxide Anatase (per kg)	52.00
Titanium RC-322 (per kg)	67.00
Zinc Oxide (per mt)	34000-38000.00
Phenol Carbolic Acid (per kg)	42.00
Carbon Tetrachloride (per kg)	16.50
Chloroform (per kg)	26.00
Sodium Sulphate (per 50 kg)	158-160.00
Naphthalene Balls (per 50 kg)	1250.00

(DELHI MARKET RATES AS ON FEBRUARY 12, 1988)

Ammonia Bicarb (per 25 kg)	125.00	Boric acid Technical (per 50 kg)	1000.00
Mercury (per flask)	9,300.00	Paraffin wax (per 50 kg)	610.00
Soda ash (per bag)	255-285.00	Tartaric acid (per 50 kg)	7,200.00
Ammonium Chloride (per 50 kg.)	110-180.00	Borax Granular (per 50 kg)	580.00
Caustic soda solid (per 50 kg)	385.00	Borax Crystal (per 50 kg)	600.00
Caustic soda flakes (per 50 kg)	380-385.00	Sodium Nitrite (per 50 kg)	700.00
Citric acid (per 50 kg)	2,250-2,475.00	Sodium Nitrate (per 50 kg)	425.00
Stable Bleaching Powder Shriram (per 25 kg)	96.00	Camphor Powder (per kg)	92.00
Stable Bleaching Powder KCI (per 25 kg)	89.00	Camphor Thal (per kg)	96.00
Stable Bleaching Powder MODI (per 25 kg)	92.00	Menthol Medium (per kg)	225.00
Sod. Bicarbonate	260-280.00	Menthol Flake (per kg)	215.00
Sod. Hydro Sulphite (per kg)	32-36.00	Menthol Bold (per kg)	235.00
Rangolite (per kg)	45-83.00	Glycerine (per kg)	45-55.00
		Sodium Silicate (per quintal)	250.00
		Hexamine (per kg)	28.00
		Acetic Acid Glacial (per kg)	14.50-18.00

DYES & COLOUR	per kg.
Naphthol AS	150.00
Naphthol ASG	235.00
Naphthol ASBS	200.00
Naphthol ASTR	302.00
Naphthol ASOL	191.00
Naphthol ASBO	208.00
DIRECT DYES	(perkg)
Black E. Conc.	92-155.00
Diazo Black B.T.	125.00
Green B.	119.00
Blue 2-B	86.00
Sky Blue FB	200.15
Basic Auramine 'O' Conc.	55-110.00
Basic Rohdamine B.500%	220-320.00
Basic Methylene Blue	92-130.00
Basic Violet	142-160.00
Basic Malachite Green	160-185.00
Acid Orange	45-52.00

Madras Market

Trading in the Madras Chemical Market came in for steady trend during the week under review. Traders were in an expectant mood, waiting for the new budget. Though the activities were dull the compounds of sodium were picked up in their prices and were transacted at higher levels. The volume of business was fair.

Ammonium Sulphate and Ammonium Acetate were done at their previous market rates. Borax Granular BML further hardened to Rs. 660 due to short supply. Boric Acid were also in demand at Rs. 982. Borax Ram Brand was offered in April delivery term at much lower rates of Rs. 590. Ammonium Bicarbonate sharply reacted to Rs. 120 per 25 kg. while Sodium Bicarbonate improved to Rs. 300 per 50 kg. Sodium Bicarbonate Birla spurted

to Rs. 302 per 50 kg. due to better buyers in the market circle.

There was interest in Copper Sulphate ISI noted small gain by Rs. 20 at Rs. 970 per 50 kg. Formic Acid lost by a rupee at Rs. 27/kg. while Cresylic Acid at Rs. 42 per kg. Soda Ash Tata improved to Rs. 325 per 75 kg. and Soda Ash Birla to Rs. 320 per 75 kg. due to heavy buying spree. Sodium shot up by Rs. 30 at Rs. 425 per 50 kg. while Sodium Oxide was sticky at Rs. 1050.

Traders were showed a small interest to do business in Sodium Nitrite marked up by Rs. 100 at Rs. 630 per 50 kg. Sodium Bicarbonate Birla went up to Rs. 425 per 50 kg from Rs. 390 per 50 kg. Sodium Cyanide increased to Rs. 55 per kg. from Rs. 50 per kg. All other chemicals remained steady around their market rates.

(MADRAS MARKET RATES AS ON FEBRUARY 13, 1988)

Aluminium Sulphate (per tonne)	1,700.00
Acetic Acid Glacial (per kg)	16.00
Ammonium Acetate (per kg)	18.00
Ammonium Bicarbonate (per 25 kg)	120.00
Ammonium Chloride Ind. (per tonne)	2,500.00
Ammonium Chloride SPIC (per tonne)	1,900.00
Bleaching Powder (per 25 kg)	100.00
Borax Granular (per 50 kg)	660.00
Carbolic Acid (per kg)	18.00
Chromic Acid Flakes (per kg)	26.00
Calcium Chloride DCM (per 50 kg)	255.00
Caustic Soda Flakes Andhra (per tonne)	8,000.00
Caustic Soda Flakes Mettur (per tonne)	8,000.00
Caustic Soda Flakes DCM (per tonne)	8,000.00
Citric Acid Deshi (per 50 kg)	2,100.00
Cobalt Oxide (per kg)	280.00
Copper Sulphate (Ram) (per 50 kg)	850.00

Cresylic Acid (per kg)	42.00
Formic Acid (per kg)	27.00
Formaldehyde (per kg)	7.00
Hydrosulphite of Soda Ind. (per kg)	33.00
Hydrosulphite of Soda Imp. (per kg)	36.00
Hydrogen Peroxide BASF (per kg)	29.00
Magnesium Carbonate Ind. (per 50 kg)	900.00
Magnesium Chloride Pure (per kg)	25.00
Oxalic Acid (per 50 kg)	1,000.00
Manganese Sulphate (Fert.) (per 50 kg)	265.00
Manganese Sulphate (Tech) (per 50 kg)	240.00
Mercury (per 3.45 kg)	9,000.00
Potassium Bichromate (per kg)	19.00
Phosphoric Acid (per kg)	15.00
Stearic Acid (per kg)	18.00
Soda Ash Tata (per 75 kg)	325.00
Soda Ash Birla (per 75 kg)	320.00
Sodium Bichromate (per kg)	19.00

Sodium Bicarbonate Tata (per 50 kg)	280.00
Sodium Bicarbonate (Birla) (per 50 kg)	302.00
Sodium Cyanide eggs (per kg)	49.00
Sodium Nitrate (per 50 kg)	425.00
Sodium Oxide (per kg)	1,050.00
Sodium Cyanide GDR (per kg)	70.00
Sodium Nitrite Bags (per 50 kg)	530.00
Sodium Silicate (per 50 kg)	2000.00
Sodium Bisulphite Aswin (per 50 kg)	225.00
Sodium Acetate (per kg)	5.10
Sodium Sulphate Powder (per tonne)	3,283.00
Sodium Sulphate (S) (per tonne)	5,200.00
Toluene (per kg)	14.00
Trisodium Phosphate (per 50 kg)	325.00
Urea Tech (per kg)	280.00
Zinc Oxide (per kg)	31.00
Zinc Chloride (per 50 kg)	700.00

SOLVENTS

Acetone (per kg)	17.00
Benzene (per kg)	16.00
Carbon Tetrachloride (per 100 kg)	1,300.00
Cellosolve (per kg)	50.00
Chloroform (per kg)	25.00
Diacetone Alcohol (per kg)	29.00
Dibutyl Phthalate (per kg)	33.00
Diethylene Glycol (per kg)	28.00
Sorbitol (per kg.)	31.00
Diocetyl Phthalate (per kg)	32.00
Isopropyl Alcohol (per kg)	22.00
Methyl Ethyl Ketone (per kg)	30.00
Nitrobenzene Indian (per kg)	12.00
Trichloroethylene (per kg)	24.00
Triethanolamine (per kg)	42.00
Turpentine Oil (per kg)	7.00
Phenol (per kg)	29.00
Propylene Glycol DCW (per kg)	28.00
Isobutanol (per kg)	20.00
Paraffin Wax (per kg)	13.50
Alkyl Benzene (per kg)	32.00
Pentaerythritol (per kg)	59.00
Glycerine HL (per kg)	48.00
Phthalic Anhydride (per kg)	28.00
Hyflosupercell (per kg)	22.00
Copper Oxide (Ram) (per tonne)	1,500.00
Zinc Chloride Solid (per kg)	11.00
Zinc Sulphate (Ram) (per tonne)	4,000.00

MATERIALS IMPORTED

BOMBAY

(From 7.12.87 to 9.12.87)

(Cost of Imported Item is
CIF Value)

(Continued from previous issue)

SULPHUR: From Italy: The Ashok Sahakari Sakhar Kharkhana, 14,657 mt, Rs. 2,31,15,249; From Taiwan: Ballarpur Industries Ltd., 2,000 mt, Rs. 30,15,902.

TITANIUM DIOXIDE: From Belgium: Lloyds Steel Ind. Ltd., 15,000 kgs., Rs. 4,60,332; From France: Gujarat Dropack Ltd., 15,000 kgs., Rs. 4,49,955; From FRG: Fairdeal Enterprises, 10 mts., Rs. 2,99,969; From FRG: Garware Nylons Ltd., 10,000 kgs., Rs. 3,06,588; From USA: Modi Rubber Ltd., 7,000 kgs., Rs. 2,14,611.

TITANIUM DIOXIDE RUTILE: From FRG: Unique Agro Ind. P. Ltd., 4,000 kgs., Rs. 1,10,770; From Japan: Joshi Engineering Works, 6,000 kgs., Rs. 1,67,211; From UAE: Stadfast Paper Mills, 4,000 kgs., Rs. 1,10,770; From UK: Bharat Heavy Electricals Ltd., 34 mt, Rs. 9,13,451; From UK: K. M. Varghese Company, 8,000 kgs., Rs. 2,21,540; From USA: Cawasji Behramji & Co., 4,000 kgs., Rs. 1,10,770.

TITANIUM TRICHLORIDE: From Italy: Lubin Plastics, 12 mts., Rs. 11,44,453.

TOLUENE DIISOCYANATES: From FRG: Resins & Plastics Ltd., 1,000 kgs., Rs. 27,140.

TRICHLOROETHYLENE: From Japan: Keytuo Chemicals Ltd., 16,500 kgs., Rs. 1,13,592; From FRG: Spectrochem P. Ltd., 90 kgs., Rs. 31,549.

3,4,5-TRIMETHOXY BENZALDEHYDE: From Brazil: Jain Plastics, 4,500 kgs., Rs. 13,10,674.

2,4-XYLIDINE: From Switzerland: Krishna Industries, 1,000 kgs., Rs. 68,988.

YELLOW PHOSPHOROUS: From FRG: Fairdeal Enterprises, 15 mts, Rs. 2,32,589.

DRUGS MATERIALS IMPORTED

BOMBAY

(From 3.12.87 to 9.12.87)

(Cost of Imported Item is
CIF Value)

ALLOPURINOL BP: From UK: Burroughs Wellcome Ltd., 250 kgs., Rs. 8,58,526.

ANALGIN: From China: IPCA Laboratories P. Ltd., 1.00 mt., Rs. 88,702.

ASCCRBIC ACID: From UK: Concept Pharmaceuticals P. Ltd., 450 kgs., Rs. 68,513.

CALCIUM -D- PANTOTHENATE USP: From UK: Bombay Pharma P. Ltd., 500 kgs., Rs. 89,364; From UK: Cynamid (I) Ltd., 1,500 kgs., Rs. 2,68,093.

CALCIUM -D- PANTOTHENATE: From UK: Sanakhai Chemicals, 2,500 kgs., Rs. 4,57,485.

CASEIN: From USA: Gujarat Insecticides Ltd., 6 mt., Rs. 2,06,530.

DIPHENYLGUANIDINE: From FRG: Bayer (I) Ltd., 1,995 kgs., Rs. 84,862.

ENZYMES: From Denmark: Malvan Distillery & Food Products, 120 kgs., Rs. 36,576; From France: Premier Polycoaters Ltd., 300 kgs., Rs. 1,09,325; From

YELLOW PYRIDON: From Japan: Arun Sales Corporation, 111.6 kgs., Rs. 19,641.

ZINC ASH: From UK: Bharat Auto Products, 19.370 mt., Rs. 1,12,835.

ZINC DROSS: From Australia: Oswal Woollen Mills Ltd., 60 mts., Rs. 5,82,446; From FRG: Raj Enterprises, 10.02 mt., Rs. 60,358; From Japan: Himson Textile Engg. Ind. P. Ltd., 42.63 mt., Rs. 2,56,789; From Pakistan: Diljit Singh Sawhney, 22 mts., Rs. 1,46,863.

Malaysia: Supertex Elastics P. Ltd., 120 kgs., Rs. 15,240.

FURAZOLIDONE: From China: Dilip Kumar & Co., 2,000 kgs., Rs. 1,85,348.

GLYCERINE 99.5%: From Australia: Rallis India Ltd., 12,000 kgs., Rs. 2,06,530.

GLYCERINE 99.5% BP-USP: From FRG: Colgate Palmolive Ltd., 83,200 kgs., Rs. 15,96,070.

HEMOGLOBIN POWDER: From Netherlands: Cadila Laboratories P. Ltd., 3,000 kgs., Rs. 51,675.

LACTOSE BP/IP: From FRG: Roussel Pharmaceuticals Ltd., 7,000 kgs., Rs. 83,876; From Taiwan: Chemicals Corporation of India, 18,000 kgs., Rs. 2,13,168.

LACTOSE BP-USP: From Netherlands: Pfizer Ltd., 10,000 kgs., Rs. 1,20,523.

LACTOSE USP: From Italy: Asian Paints India Ltd., 12,000 kgs., Rs. 1,40,435; From Netherlands: Expee Agencies, 19,000 kgs., Rs. 2,32,312.

ALPHA-LYSINE MONO HYDROCHLORIDE — FEED GRADE: From Japan: Aries Agro Vet Industries, 2,000 kgs., Rs. 75,463.

ALPHA-LYSINE MONOHYD-
CHLORIDE USP PHARMA
ADE: From Japan: Sarabhai
International, 10,000 kgs., Rs.
9,900.

MANNITOL USP: From Bra-
: Tata Exports Ltd., 1,000 kgs.,
s. 22,507.

METHIONINE HYDROXY AN-
LOG: From USA: Avipharma,
570 kgs., Rs. 45,581; Indian
yestuff Industries, 2,019 kgs.,
s. 61,465.

MORPHOLINE: From UK: Ba-
er (I) Ltd., 163.8 mt., Rs.
99,018.

MORPHOLINE 99%: From
USA: Bayer (India) Ltd., 15.02
mt., Rs. 3,67,950.

NEOMYCIN SULPHATE BP :
From Taiwan: Aarkays Imports
Corporation, 100 kgs., Rs.
37,378.

NICOTINAMIDE USP XX/BP :
From Switzerland: Concept Phar-
maceuticals P. Ltd., 225 kgs., Rs.
19,362.

PANCREATINE: From Finland:
B. K. Paper Mills Pvt. Ltd., 500
kgs., Rs. 2,32,312.

PEPSIN : From Denmark: Ral-
lis India Ltd., 400 kgs., Rs.
1,75,663.

PHENOL USP GRADE: From
Japan: A.P. Chemicals, 19,000
kgs., Rs. 2,64,121.

POLYSORBATE: From Japan :
Cadila Veterinary, 2,000 kgs., Rs.
63,707.

PROPYLENE GLYCOL USP:
From Netherlands: B. L. Indus-
tries, 17.2 mt., Rs. 1,86,725;
From USA: Choudhary Interna-
tional, 16,770 kgs., Rs. 1,82,057;
H. Uttamlal (Exports) P. Ltd.,
4.30 mt., Rs. 47,250; Sarabhai
Chemicals, 51,600 kgs., Rs.
5,73,275; Wockhardt Limited,
11,825 kgs., Rs. 1,29,155.

RAFOXANIDE 50%: From UK:
Dynamic Pharmaceuticais Pvt.
Ltd., 300 kgs., Rs. 2,42,277.

SODIUM GLUCONATE: From
FRG: Grauer & Weil (I) Ltd., 2.0
mt., Rs. 45,531.

SORBITOL BP/USP: From Ja-
pan: 3,000 kgs., Rs. 51,632.

SOYALECITHIN: From Italy:
Scan Footwear Industries P. Ltd.,
18 mts., Rs. 1,19,152.

SULFAMERAZINE BP / USP:
From Netherlands: Bharat Heavy
Electricals Ltd., 500 kgs., Rs.
1,27,504.

TARTARIC ACID BP/USP:
From FRG: Sports College, 18
mt., Rs. 6,59,737.

L-TARTARIC ACID BP-IP :
From Spain: Pfizer Ltd., 2,000
kgs., Rs. 80,362.

PLASTIC MATERIALS IMPORTED

(From 3.12.87 to 9.12.87)
(Cost of Imported Item is
CIF Value)

CHLORINATED POLYETHY-
LENE: From USA: Finolex Cab-
les Ltd., 5 mt., Rs. 1,53,243.

EPOXY PLASTICIZER: From
Korea: Space Chemplast P. Ltd.,
2.90 mt., Rs. 79,655.

HDPE: From Australia: Naresh
Textile Mills, 24.75 mt., Rs.
2,96,541; Oswal Wollen Mills,
12.5 mt., Rs. 96,342; From Bra-
zil: Alok Enterprises, 55 mt., Rs.
4,39,164; From Czechoslovakia:
Hardik Industrial Corporation,
175 mt., Rs. 13,48,788; Naresh
Paper Bag Co., 12.5 mt., Rs.
96,342; From FRG: KSB Pumps
Ltd., 17 mt., Rs. 1,91,858; Vib-
gyor Distributors, 25 mt., Rs.
2,78,518; From France: Wires &
Fabriks (SA) Ltd., 17 mt., Rs.
1,91,858; From Iran: Uttam Inter-
national, 17 mt., Rs. 2,07,752;
From Japan: Mahindra & Mahin-
dra Ltd., 10 mt., Rs. 1,19,814;
From Saudi Arabia: Associated
Brothers, 24.75 mt., Rs.
2,78,519; Bombay Synthetic P.
Ltd., 51,450 kgs., Rs. 5,75,576;
Cello Plastic Industrial Works,

49.50 mt., Rs. 5,57,031, Kejri-
wal Plastic Industries, 17.15 mt.,
Rs. 2,02,076, Milan Plast, 49.50
mt., Rs. 5,57,038; Phoel Indus-
tries, 17.15 mt., Rs. 1,94,129;
S. S. Enterprises, 17.15 mt., Rs.
2,02,076; Satyanarayan Plastic
Inds., 49.50 mt., Rs. 5,17,716;
Silver Plastrochem P. Ltd., 17.15
mt., Rs. 1,92,994; Polyset Plas-
tics Pvt. Ltd., 24.75 mt., Rs.
2,76,880; P. Plast, 99 mt., Rs.
11,07,520; Universal Luggage
Mfg. Co., 239 mt., Rs. 24,50,-
526; Vallabh Polypac Ind. P.
Ltd., 17,150 kgs., Rs. 2,02,076;
V. Plast, 24.75 MT, Rs. 2,96,541;
From Sweden: ITI Ltd., 17 mt.,
Rs. 1,91,858; From UK: Ashoka
Traders, 24.75 mt., Rs. 2,76,880;
Eastern Trading Co., 17 mt., Rs.
1,91,858; M. S. Trading Co.,
17,150 kgs., Rs. 1,01,858; From
USA: Danshit Enterprises, 17.50
mt., Rs. 1,44,803; Gopala Poly-
plast Ltd., 54 mt., Rs. 5,43,335;
From USSR: Podar Industrial
Corpn., 20 mt., Rs. 2,39,628;
From Yugoslavia: Harkab Hold-
ing Pvt. Ltd., 200 mt., Rs.
22,04,273.

HDPE BLOW MOULDING
GRADE: From Czechoslovakia:
Fibro Plast Corpn., 50 mt., Rs.
3,85,368; Mehta Traders, 12.5
mt., Rs. 96,342; Naresh Traders,
12.50 mt., Rs. 96,342; Plastic
Trading Corpn., 25 mt., Rs.
1,92,084; Valia Impex Pvt.
Ltd., 50 mt., Rs. 3,85,868; From
USA: United Brothers, 52.50 mt.,
Rs. 4,34,409; From Yugoslavia :
Harkab Holdings Pvt. Ltd., 20
mt., Rs. 2,17,771; Ravi Interna-
tional, 375 mt., Rs. 40,85,925.

HIGH IMPACT POLYSTYRE-
NE: From Korea: XPro India, 67
mt., Rs. 12,52,135.

IGNOMER RESIN: From Swe-
den: Upcom Cables Ltd., 1,134
kgs., Rs. 33,627.

LDPE: From Afganistan: Pu-
ja Enterprises, 50,000 kgs., Rs.
5,97,922; From Brazil: Cello

Plastic Industrial Works, 10 mt., Rs. 1,19,152; Hindustan Conductors P. Ltd., 50,000 kgs., Rs. 5,97,922; K. Raheja Mercantile Corpn., 40 mt., Rs. 4,76,608; From Iraq: Jaysinh Kumar & Co., 50,000 kgs., Rs. 5,97,922; From Japan: Bharat Heavy Electricals Ltd., 38.5 mt., Rs. 4,32,425; Lub Cut Incorporation, 200 mt., Rs. 24,62,029; From Netherlands: Navdeep Polymers Ltd., 50,000 kgs., Rs. 5,97,922; From Qatar: Indian Petrochemicals Corpn., 1,287 mt., Rs. 1,61,05,875; Plastics & Polymers Pvt. Ltd., 33 mt., Rs. 4,21,601; From Saudi Arabia: Associated Brothers, 24.75 mt., Rs. 2,94,902; P. Plast, 24.75 mt., Rs. 3,03,094; Prakash Enterprises, 74.25 mt., Rs. 8,84,707; Sachdeva Enterprises, 50,000 kgs., Rs. 5,97,922; From Singapore: Commercial Explosives Ltd., 17 mt., Rs. 2,25,066; V. K. Engg. & Plastic Inds., 33 mt., Rs. 4,32,523; From UK: International Conveyors Ltd., 17 mt., Rs. 2,02,559; Malhotra Global Eximp Pvt. Ltd., 50 mt., Rs. 5,97,922; Malhotra International Ltd., 50 mt., Rs. 5,97,922; From USA: Aashish Enterprises, 16.74 mt., Rs. 2,06,188; Arjuna Mercantile Ltd., 85,000 kgs., Rs. 10,21,225; The Supreme Inds. Ltd., 155.15 mt., Rs. 15,46,650; From Yugoslavia: Bihani Plastic Udyog, 100 mt., Rs. 11,95,844; From Zambia: Sipta Coated Steel Ltd., 50,000 kgs., Rs. 5,97,922.

LDPE BLACK COMPOUND: From USA: Upcom Cables Ltd., 112 mt., Rs. 15,46,989.

LLDPE: From Saudi Arabia: Gupta Carpets Udyog Ltd., 24.75 mt., Rs. 2,94,902; Prakash Enterprises, 24.75 mt., Rs. 2,94,902; VIP Industries Ltd., 33 mt., Rs. 3,93,203; From Taiwan: Norplex Oak India Ltd., 50 mt., 6,06,188; From USA: Ecoplast P. Ltd., 24.75 mt., Rs. 2,94,902.

LOW DENSITY POLYETHYLENE POLYOLEFINS: From Norway: Ahmed & Moloobhoy & Sons, 10 mt., Rs. 1,19,152; From Pakistan: R. N. Bhatia & Co., 10 mt., Rs. 1,19,152; Vanita Vadilal Shah, 10 mt., Rs. 1,19,152; Vansha Traders, 10 mt., Rs. 1,19,152; From USA: Sekhsaria Chemicals Pvt. Ltd., 10 mt., Rs. 1,19,152.

MEDIUM DENSITY POLYETHYLENE: From France: Delhi Steel Corporation, 65 mt., Rs. 8,76,763.

PE MOULDING POWDER: From UAE: Bharat Petroleum Corpn., 14 mt., Rs. 2,09,535.

POLYACETAL MOULDING POWDER: From Sweden: Bharat Heavy Electricals Ltd., 2,000 kgs., Rs. 58,252.

POLYCARBONATE MOULDING POWDER: From FRG: Jai Plastics, 13,860 kgs., Rs. 5,02,776; New Plastomers India Ltd., 13.86 mt., Rs. 5,02,776; From USA: Goodyear India Ltd., 13.86 mt., Rs. 5,02,776.

POLYCARBONATE RESIN: From Japan: Zenith Tin Works Pvt. Ltd., 15 mt., Rs. 8,64,619.

POLYETHYLENE WAX: From Japan: Dr. Yajniks Allied Chemical Industries, 2.0 mt., Rs. 41,042.

POLYPROPYLENE: From Brazil: Accurate Pipes & Plastics, 500 kgs., Rs. 30,800; From FRG: Garware Paints Ltd., 16 mt., Rs. 2,88,385; From France: Oswal Woollen Mills Ltd., 80 mt., Rs. 14,08,647; From Italy: Kay Packagings P. Ltd., 60 mt., Rs. 9,49,248; Kevin Enterprises, 30 mt., 3,61,430; XPro India Ltd., 15 mt., Rs. 2,10,503; From Japan: Goodlass Nerolac Paints Ltd., 16 mt., Rs. 2,88,335; Panos Electronics P. Ltd., 15.5 mt., Rs. 2,88,808; The Premier Automobiles Ltd., 618 kgs., Rs. 31,154; From Singapore: Bina Corporation, 16 mt., Rs. 2,83,848; From

Yugoslavia: Sharp Impex Ltd., 15.5 mt., Rs. 3,00,703.

POLYPROPYLENE MOULDING POWDER: From Singapore: K. Raheja Mercantile Corporation, 16 mt., Rs. 2,77,493.

POLYSTYRENE: From FRG: JBA Printing Inks Ltd., 10 mts., Rs. 1,46,343; Sunflag Iron & Steel Co., Ltd., 25 mts., Rs. 3,64,077; From Japan: New Tech Tool Mfg., 10 mts., Rs. 1,46,342; From USA: Banas Tube & Foundries, 25 mts., Rs. 3,64,077; Win Medicare Ltd., 10 mts., Rs. 1,46,343.

POLY TETRA FLUOROETHYLENE: From FRG: Jain Homoeopathic Pharmacy, 500 kgs., Rs. 69,505; From Japan: Kalyan Brakes Ltd., 15 kgs., Rs. 21,464; From USA: Indian Farmers Fertilisers Co. Ltd., 2,750 kgs., Rs. 3,38,260.

POLY TETRA FLUOROETHYLENE RESIN: From USA: Warner Hindustan Ltd., 500 kgs., Rs. 72,815.

POLYURETHANE RESIN: From FRG: Super Label Mfg. Co., 15 kgs., Rs. 2,386.

POLYVINYL ALCOHOL: From Italy: Corrosion Engineers, 1.5 mt., Rs. 32,052; From Japan: Mahabir Dyeing & Printing Mills, 1,000 kgs., Rs. 21,183; Pidilite Industries Pvt. Ltd., 2,000 kgs., Rs. 42,365; The Raipur Mfg. Co. Ltd., 2,000 kgs., Rs. 41,968; Triveni Chemicals Pvt. Ltd., 10,000 kgs., Rs. 2,11,826.

PTFE RESIN: From Denmark: Mohan Rocky Springwater Breweries, 1,100 kgs., Rs. 1,13,857; From Italy: Plastic Products Engg. Co., 1,000 kgs., Rs. 1,21,800; From Japan: Golden Dye & Chemicals, 84 kgs., Rs. 20,700; Indoflon Polymers, 1,000 kgs., Rs. 1,27,427; From USA: Unnati Corporation, 488.69 kgs., Rs. 60,291.

POLYVINYL CHLORIDE: From Saudi Arabia: Prince Plastics, 49.50 mt., Rs. 6,22,570.

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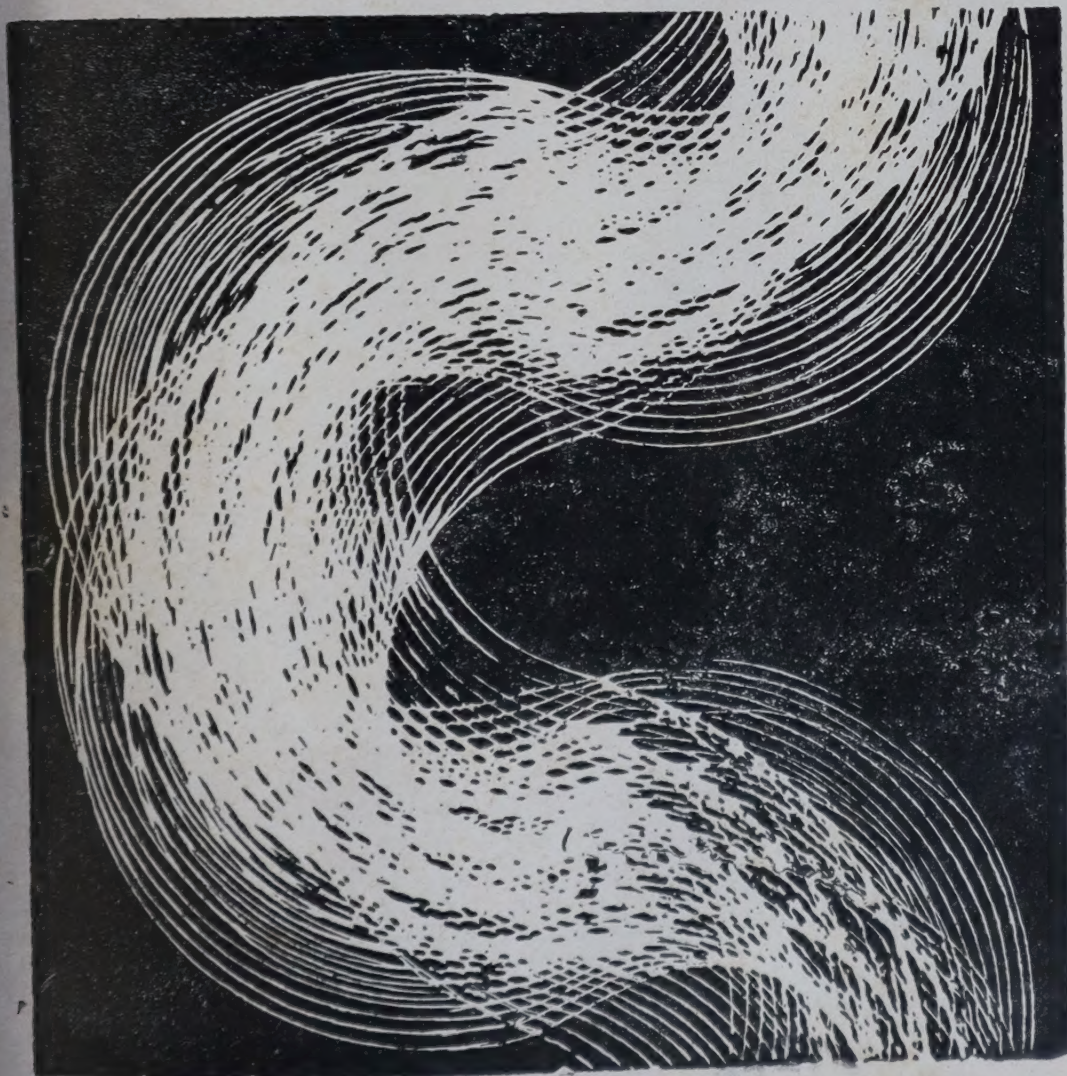
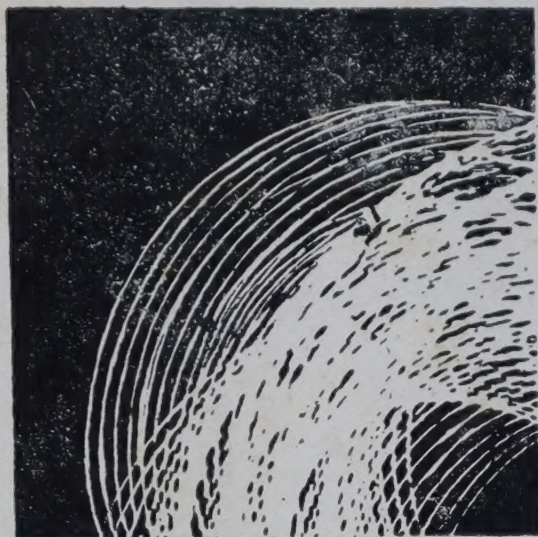
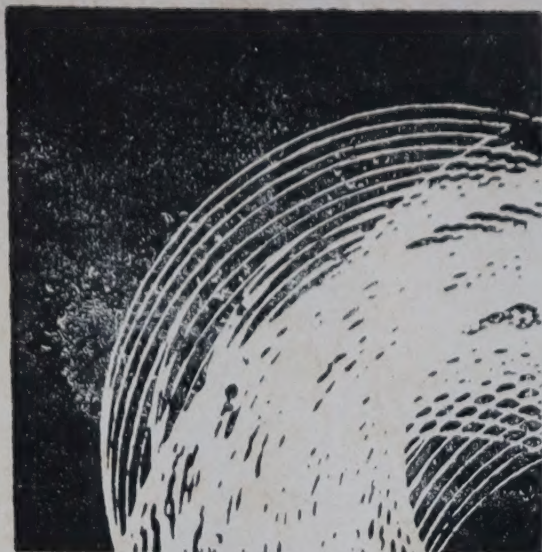
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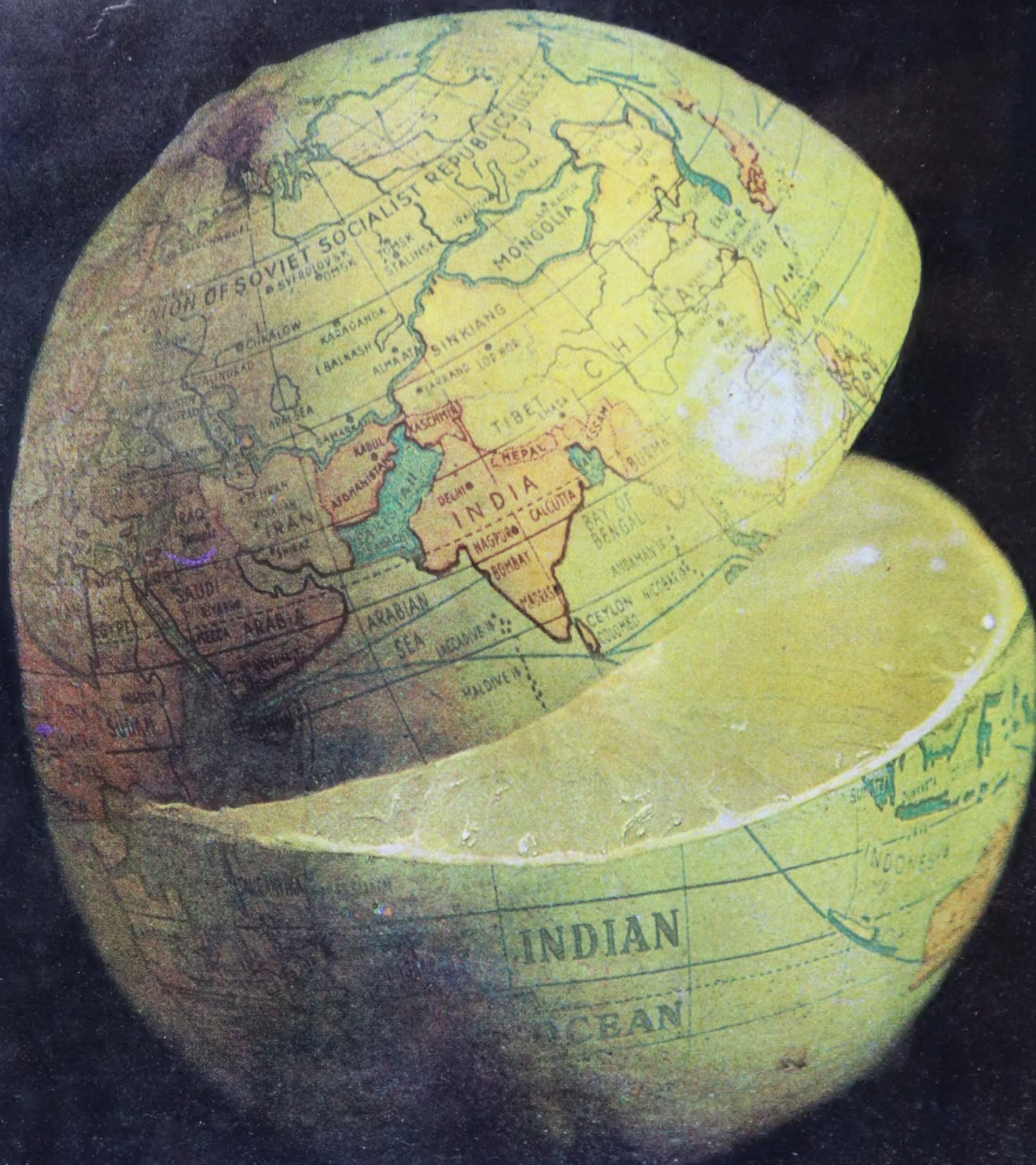


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